

AUTOMOTIVE INDUSTRIES

A C H I L T O N P U B L I C A T I O N

APRIL 15, 1960

Features • • •

**QUALITY CONTROL
MEN AT WORK**

**MACHINE STANDARDS
PROPOSED BY USERS**

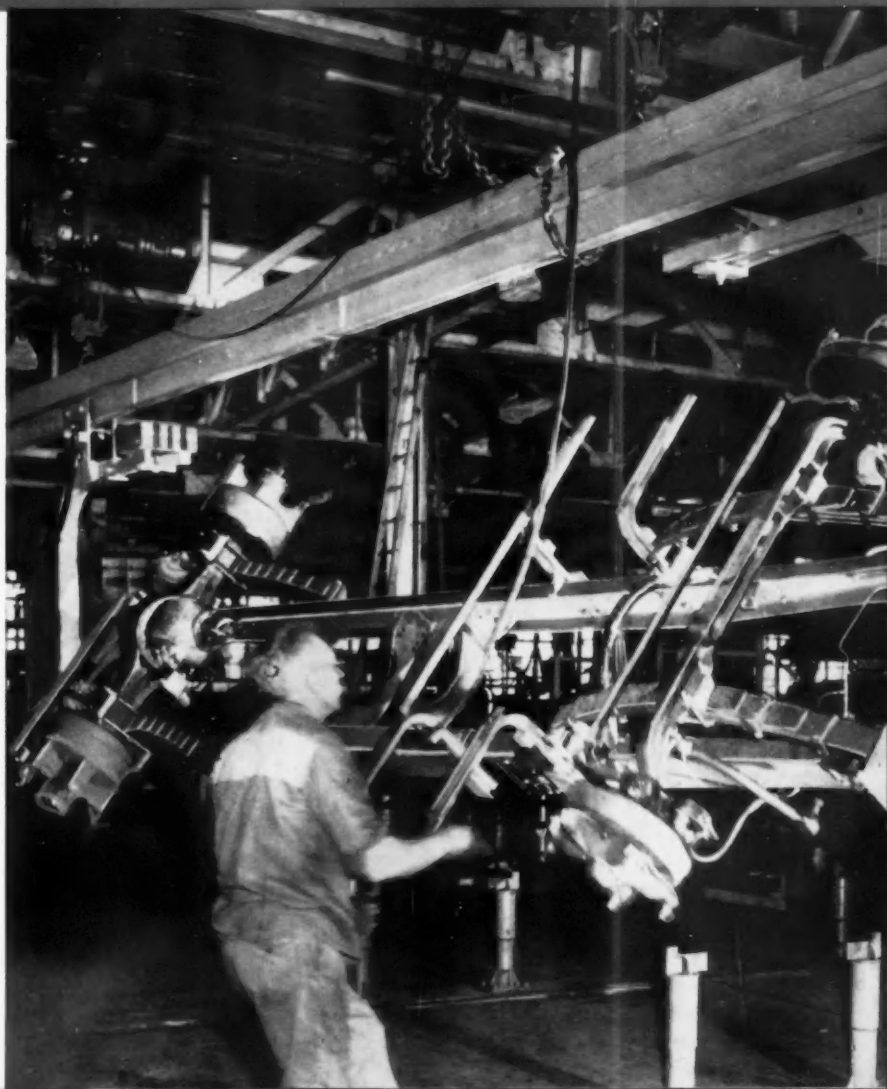
**COMMUNIST VEHICLES
AT LEIPZIG FAIR**

**PREVIEW OF THE
ASTME TOOL SHOW**

chassis roll-over at Dodge Truck ►

Flipping the Dodge
heavy-duty truck chassis
into normal position
using overhead-mounted
Roll-Over Fixture

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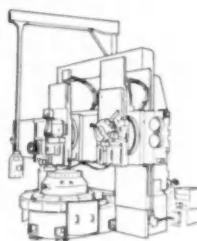


**ENGINEERING
MANAGEMENT • DESIGN • PRODUCTION**

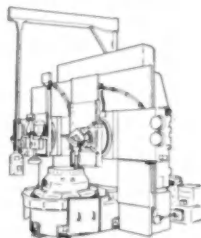


new

from **HEALD**



IT PRECISION GRINDS
I.D.s, O.D.s, Tapers and Faces



IT BORES, turns, faces
grooves and chamfers

MODEL 578 VERTICAL GRINDING MACHINE

speeds rebuilding of jet engines at United Air Lines

REFINISHING big jet engine parts calls for high precision internal and external grinding, as well as a variety of rough and finish boring, turning and facing operations. United Air Lines is meeting both of these requirements to excellent advantage with the completely new Heald Model 578 Vertical Grinding Machine shown above.

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AUTOMOTIVE INDUSTRIES

A CHILTON MAGAZINE • PUBLISHED SEMI-MONTHLY

APRIL 15, 1960

Passenger Cars • Trucks • Buses • Aircraft • Tractors
• Engines • Bodies • Trailers • Road Machinery •
Farm Machinery • Parts and Components • Accessories
• Production and Processing Equipment •
Design • Production • Engineering • Management

VOL. 122 No. 8

Features . . .

▼ Automotive Quality Control Men at Work

By organizing and developing a 389-member division in which automotive aspects of quality control could be discussed on a specialized basis, the ASQC has greatly aided the ability of automotive quality control engineers to advance their professional aims. Activities of the organization are covered in a five-page article. Page 57

▼ Assembly Facilities for Dodge Trucks

With the more extensive line of Dodge heavy duty trucks, an entire building has been set aside for assembling and testing them. The article is by Joseph Geschelin. Page 62

▼ Proposed Standards for Machine Tools

Some 60 or more metalworking manufacturers, at a meeting in Detroit last month, laid the foundation for standardizing certain features of general purpose machine tools. Page 65

▼ Vehicles at the Leipzig Fair

The fact that the automobile industry is one of the weakest sectors in East Germany's economy was brought out at the Leipzig Fair. This event is described in an article by David Scott. Page 66

▼ Design of the Mighty Mite Engine

The small V-4 aircooled engine which is being built for powering the Mighty Mite

vehicle is of all-aluminum construction. Basic design details are described and illustrated. Page 68

▼ Brake Cylinders Bored at High Rate

A six-station setup at Chrysler's Highland Park Plant is precision-boring 405 gray iron rear wheel brake cylinders per hour at 75 per cent efficiency. Page 70

▼ SAE National Automobile Week Meeting

Reports on current developments, rather than advanced projects, predominated at the SAE National Automobile Week Meeting, held in Detroit last month. High spots of the event are covered. Page 71

▼ Preview of the ASTM Tool Show

This year's tool show of the American Society of Tool and Manufacturing Engineers is expected to be the biggest and best yet. Many of the new devices at the show which have application in the automotive industries are described and illustrated. Page 72

▼ SAE National Production Meeting

Explosive forming, electrochemical milling, and cold extrusion were among the out-of-the-ordinary techniques discussed at the SAE National Production Meeting. Page 79

▼ 57 New Product Items and Other Features Such as:

Machinery News, Government Contracts, Observations, and Manufacturers' News.

. . . continued on next page

MEMBER



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AUTOMOTIVE INDUSTRIES, April 15, 1960

AUTOMOTIVE INDUSTRIES

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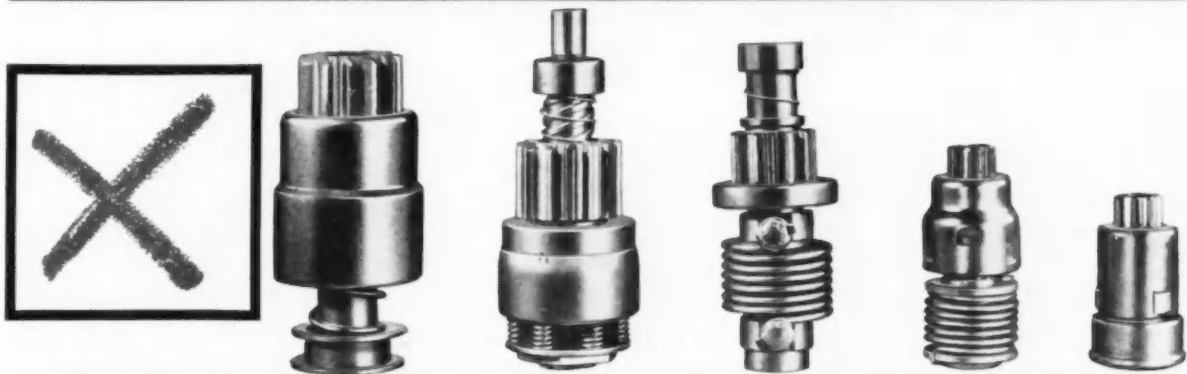
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TERRA-TIRES turn soft sand into smooth "highway"



Power Wagon photo courtesy McKenzie Export Company, Houston, Texas, and Chrysler Corporation

Most camels would walk a mile to skirt sand dunes like these. But this new-style "ship of the desert" cruises right over powdery, shifting sands on remarkable Terra-Tires by Goodyear.

Here's how McKenzie Export Company, suppliers to the oil industry, modified a Dodge Power Wagon to check out Terra-Tire performance.

- ★ **First**, they roared over paved highways for 600 miles at 45 mph!
- ★ **Then**, they wheeled for hours through tricky, treacherous sand wastes at Padre Island, Texas—terrain rated worse than the North African desert.
- ★ **Finally**, they took the truck's 17,110 pounds through the deepest, stickiest mud around, followed up with a cruise through normally impassable rice paddies.

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GOODYEAR

Terra-Tire—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

Terra-Tire pays off in "go-anywhere" mobility



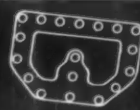
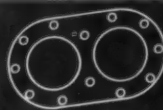
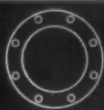
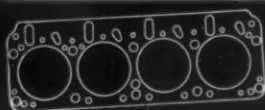
Louisiana—Crane "Marshbuggy" rolls through knee-deep mud.



Pakistan—Terracruzer rides high through rough going.



Panama—Banana carrier hauls fruit unbruised from remote groves.



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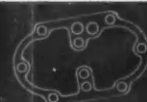
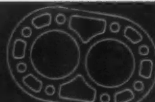
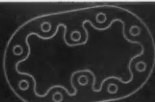
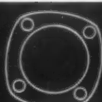
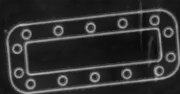
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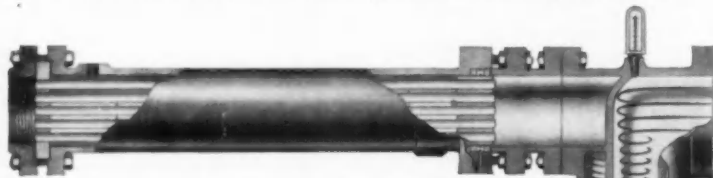
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CALENDAR

OF COMING SHOWS AND MEETINGS

-
- International Automobile Show,
New YorkApr. 16-24
- Annual Conference on Automatic
Techniques, ClevelandApr. 18-19
- American Machine Tool Distribu-
tors' Assn., Spring Meeting,
White Sulphur SpringsApr. 18-20
- ASLE, 15th Annual Meeting,
CincinnatiApr. 19-21
- SPI Cellular Plastics Div., Auto-
motive Conference, DetroitApr. 20-21
- American Society of Tool and Man-
ufacturing Engineers, Tool
Show, DetroitApr. 21-28
- ASME Maint. and Plant Engineer-
ing Conference, St. Louis ..Apr. 25-26
- AWS, 41st Annual Meeting and
Welding Show, Los Angeles
Apr. 25-29
- American Society for Metals, 2nd
SW Metal Exposition and Con-
gress, DallasApr. 25-29
- ISA, 2nd Instrument - Automation
Conference and Exhibit, San
FranciscoMay 9-12
- American Foundrymen's Society,
Casting Congress and Exposi-
tion, Phila.May 9-13
- 8th International Automobile Tech-
nical Congress, The Hague..May 9-13
- AIEE, Conference and Convention,
DallasMay 12-14
- ASME Production Engineering Con-
ference, MilwaukeeMay 17-19
- ASME 32nd Annual Oil and Gas
Power Conference, Kansas City
May 22-26
- Design Engineering Show, New
YorkMay 23-26
- ASME Summer Meeting and Avia-
tion Conference, DallasJune 5-9
- SAE Summer Meeting, Chicago..June 5-10
- AGMA (Gear Mfrs.) Annual Meet-
ing, Hot Spring, Va.June 6-8
- Material Handling Institute, New
England Show, BostonJune 6-8
- 1960 Western Packaging & Materials
Handling Exposition, Los An-
gelesJuly 19-21
- American Astronautical Society,
Western National Meeting,
SeattleAug. 8-11
- Machine Tool Exposition — 1960
(sponsored by National Machine
Tool Builders' Assn.), Chicago
Sept. 6-16

AUTOMOTIVE INDUSTRIES, April 15, 1960

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Photograph permission RCA.

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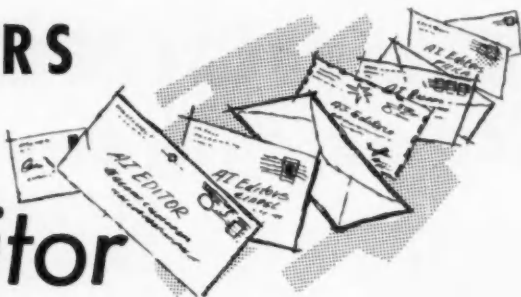
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LETTERS

to the

Editor



Readers' opinions or requests for additional information on material appearing in the editorial pages of AUTOMOTIVE INDUSTRIES are invited for this column. No unsigned letters will be considered, but names will be withheld on request. Address *Letters to the Editor*, AUTOMOTIVE INDUSTRIES, 56th & Chestnut Sts., Philadelphia 39, Penna.

AUTOMOTIVE STANDARDS

Mr. Doane's article on Automotive Standards is extremely interesting and provides a comprehensive account of the activities in connection with international standards for the industry.

C. W. Jackman
Chevrolet Engineering Center
Chevrolet Motor Div.
General Motors Corp.
Detroit, Mich.

Mr. Doane's article on "International Standardization for the Automobile" is exceedingly interesting and it brings out a number of things of which I must admit I was not aware.

G. F. Hussey, Jr.
Managing Director
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New York, N. Y.

HOW TO SELL FORD

Please place our name on the list of people to receive "How to Sell Ford Motor Co." by Earle T. Ward, as per your notice in *Industrial Marketing Magazine*.

We found the article to be very interesting and informative and would like more information on this.

Alex Floudaras
Advertising Manager
Guardian Industrial Products Inc.
Roslindale, Mass.

● We are happy to include your name on the list.—Ed.

SILICON RECTIFIERS

We have read with interest the article "Silicon Rectifiers for A C Generating Systems" which appeared in a recent issue of your publication.

We feel that the information contained in this article would be quite useful to our Engineering and Sales personnel.

We would greatly appreciate your permission to reprint the article for distribution by our Sales Department.

L. F. Stewart
Customer Assistance Group
Research & Engineering
Delco Radio Div.
General Motors Corp.

● Permission granted. Happy to oblige our friends at Delco.—Ed.

ENGINE SPECS

I would appreciate receiving a wall chart of the 1960 specifications covering small gasoline engines. I greatly enjoy reading AUTOMOTIVE INDUSTRIES each month.

F. W. Fisher
Manager of Advertising
Ampex Data Products Co.
Redwood City, Calif.

● The wall chart will be published this month. Your name is on the list.—Ed.

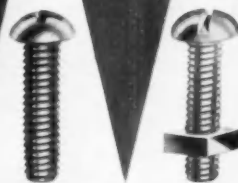
TRANSFER MACHINES

Several of our management people have requested copies of your article, "New Transfer Machines at Saginaw Steering," published in the February 15 issue of AUTOMOTIVE INDUSTRIES.

Would you please send six copies marked to my attention.

W. K. Mitchell
Director of Public Relations
Saginaw Steering Gear Div.
General Motors Corp.
Saginaw, Mich.

● Your copies are on the way.—Ed.



FOR VARIETY

STANDARDIZE 100%
ON SOUTHERN
FASTENERS

A stock of 1,500,000,000 USA-made fasteners means that Southern's variety of items, sizes, materials, head styles and finishes can be your source of constant supply. Standardize 100% on Southern fasteners, and forget about carrying a large, costly, space-consuming inventory. Let Southern's variety and famous service help solve your fastener problems.

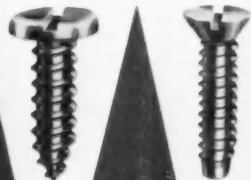
It will pay you to try Southern on your next order. Write today, using your letterhead, for our Stock List showing current variety of fasteners ready for delivery in large or small quantities. Address Southern Screw Company, P. O. Box 1360, Statesville, North Carolina.

Manufacturing and Main Stock
in Statesville, North Carolina

WAREHOUSES:

New York • Chicago • Dallas • Los Angeles

Machine Screws & Nuts • Tapping
Screws • Wood Screws • Stove
Bolts • Drive Screws • Carriage
Bolts • Continuous Threaded Studs



Circle 114 on Inquiry Card for more data

ANNOUNCING

NEW GISHOLT 3F FASTERMATIC

WITH

FeeDial

CONTROL



DIAL YOUR FEEDS



FLICK YOUR SPEED & FUNCTION SWITCHES



IN JUST 15 MINUTES!

...then set your tools and take your trial cuts. That's how fast and simple it is to set up the new Gisholt MASTERLINE 3F FASTERMATIC Automatic Chucking Turret Lathe!

Only 15 minutes to pre-select feeds, speeds and functions—Now the desired feed rate is individually selected for each tooling station by turning a dial control. Selection of spindle speeds and machine functions is equally fast—just flick toggle switches. You do it all in just 15 minutes.

Completely automatic—But your savings don't end with fast setup. The automatic cycle assures consistent quality at fixed production rates. Any operator, even a new man, can chuck the work, start the cycle and remove the finished part. He has ample time to handle another machine.

What's more fast setup makes the new 3F pay off big on machining small lots—25 to 50 pieces—as well as long production runs. Contact your Gisholt Representative, or write us.

Send for literature—Ask your Gisholt Representative to show you how this new 3F with FeeDial can cut costs on your work.



GISHOLT

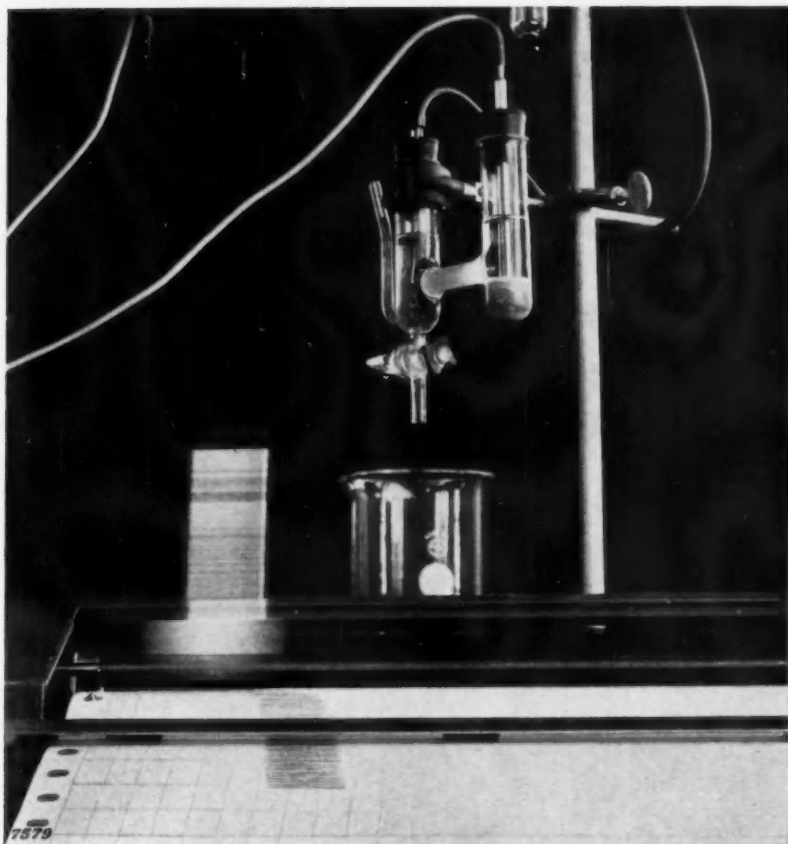
MACHINE COMPANY

Madison 10, Wisconsin

- Turret Lathes • Automatic Lathes
- Balancers • Superfinishers • Threading Lathes
- Factory-Rebuilt Machines with New-Machine Guarantee

Investigate Gisholt's Extended Payment and Leasing Plans

ANALYTIC "BLOODHOUND" SNIFFS OUT SECRETS OF BEARING CORROSION

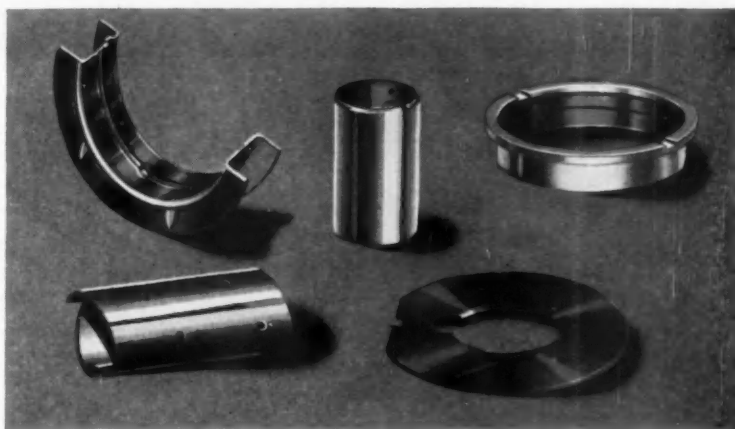


WE USE THIS HYPERSENSITIVE DEVICE TO TRACK DOWN ENGINE BEARING CORROSION TO ITS SOURCE.

This instrument needs only a minute fragment of metal for accurate analysis. Consequently, engine bearing corrosion can be traced from its beginning through complete destruction of the bearing surface. Because test variables are minimized, Federal-Mogul engineers can accurately relate degree of corrosion to specific engine operating conditions. This analytical tool is in continual use in our laboratory, assisting research on many different projects. Prevention of corrosion and development of new bearing alloys are high on the list!

SUCCESSFUL BEARING PERFORMANCE

depends on selecting the proper alloy for the operating conditions to be met. Federal-Mogul engineers have had years of experience with bearings and applications of all kinds . . . and this wealth of knowledge is available to bearings users. This is one reason why F-M sleeve bearings, precision thrust washers, formed bushings, and low-cost spacers are chosen for use in virtually everything from baby buggies to heavy industrial cranes.

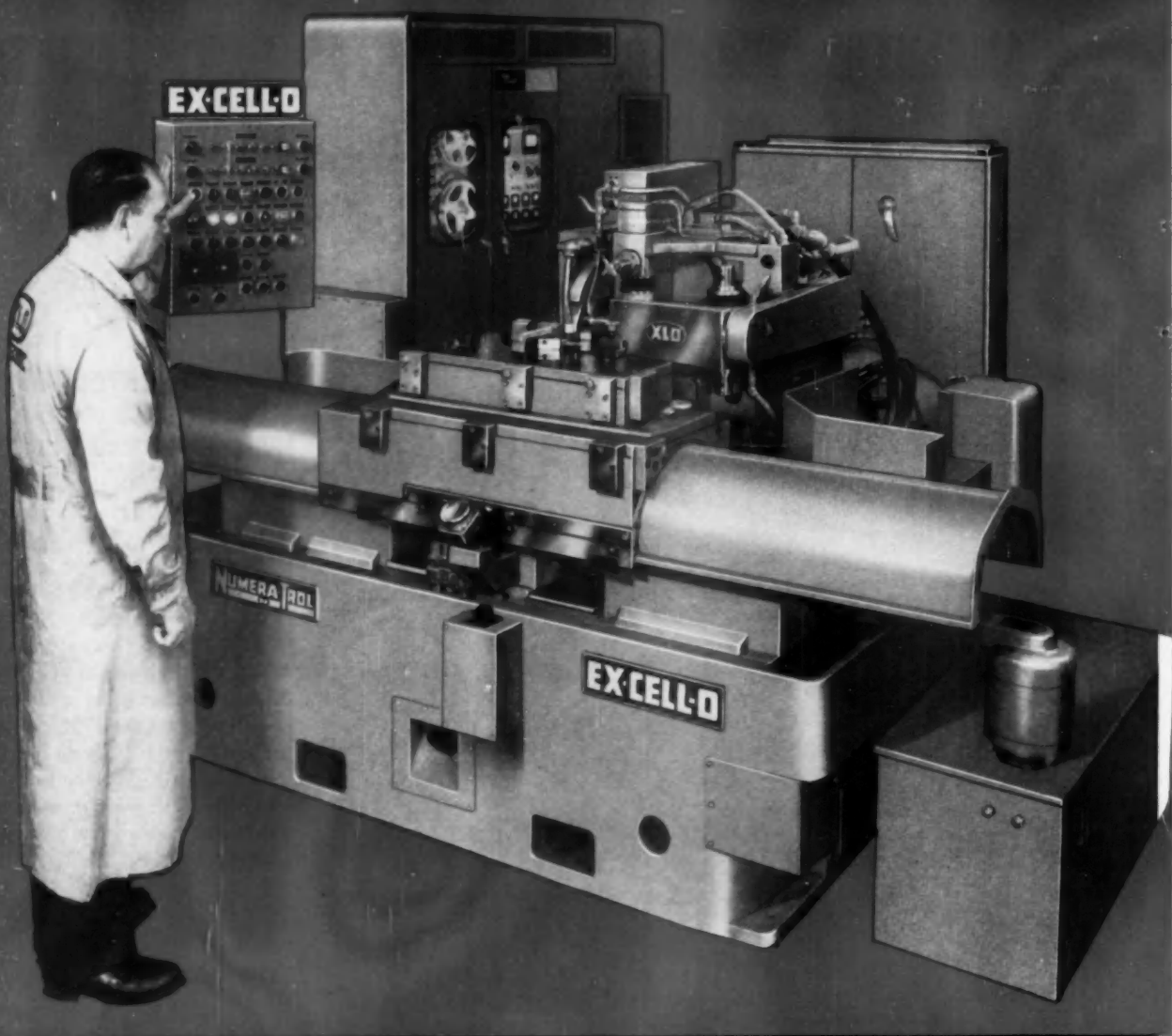


There's much valuable data in our Design Guides on sleeve bearings, thrust washers and bushings; and in our brochure on spacers. For your copies, write Federal-Mogul Division, Federal-Mogul-Bower Bearings, Inc., 11037 Shoemaker, Detroit 13, Michigan.

FEDERAL-MOGUL

sleeve bearings
bushings-spacers
thrust washers

DIVISION OF
FEDERAL-MOGUL-BOWER
BEARINGS, INC.



TOLERANCES IN MILLIONTHS...

**Plus versatility—
Interchangeable Units
for tape-controlled
Grinding, Turning
and Boring**

SPACE-AGE ACCURACY—The Standard 922 Contouring Machine's main slide and cross slide are controllable in increments of .000025" automatically or manually. Dial the dimension, from .000025" to .10", and the main slide or cross slide of this two-axis machine advances or retracts by that amount—exactly!

ECONOMY, VERSATILITY—Building-block construction permits changing in minutes from a precision grinding assembly to a precision turning-boring unit. Unitized design adds versatility, cuts downtime.

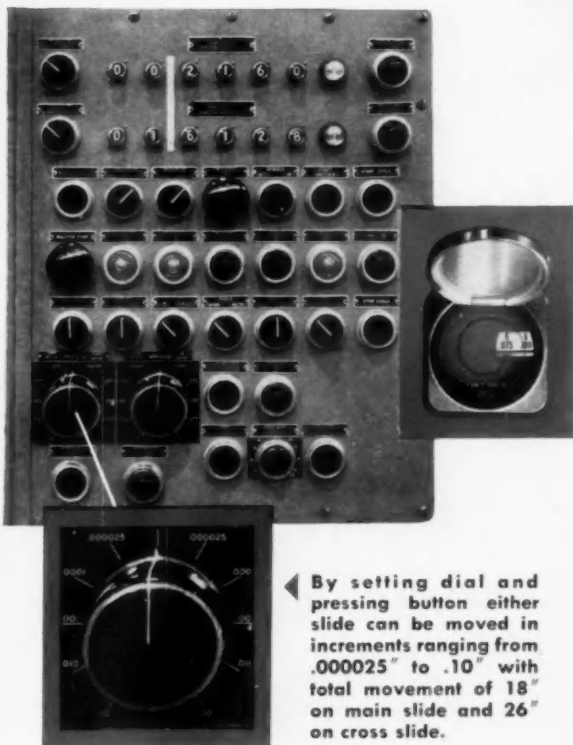
FULLY TAPE-CONTROLLED—Used with high-performance pulse data input, the Standard 922 provides fully automatic turning, boring and grinding, plus wheel dressing and dressing compensation.

TOMORROW'S MACHINES, TODAY—The Standard 922 is the latest in a line of Numera-Trol Machines performance-proved in customers' plants. Others include Precision Milling and Grinding Machines for machining turbine blades, small cams and other prototypes and production parts.

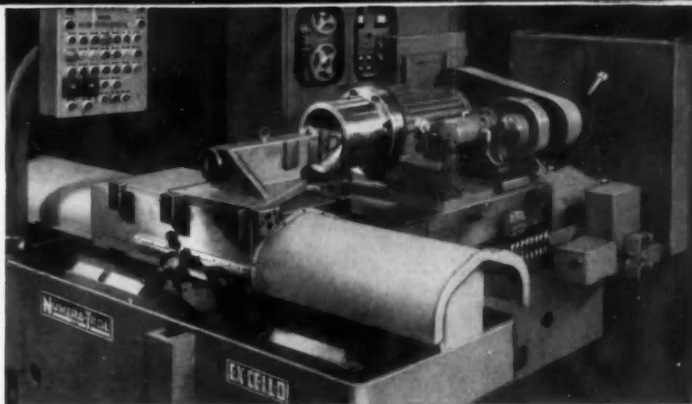
Circle 117 on Inquiry Card for more data →

◀ Standard Numera-Trol 922 equipped with grinding unit for precision templet grinding. Grinding assembly is easily interchangeable with boring and turning unit for accurate contouring operations.

Machine is equipped for contouring by mounting boring and turning unit on main slide and tool holder on cross slide. Spindle speeds are automatically varied to maintain constant cutting speeds. ▶

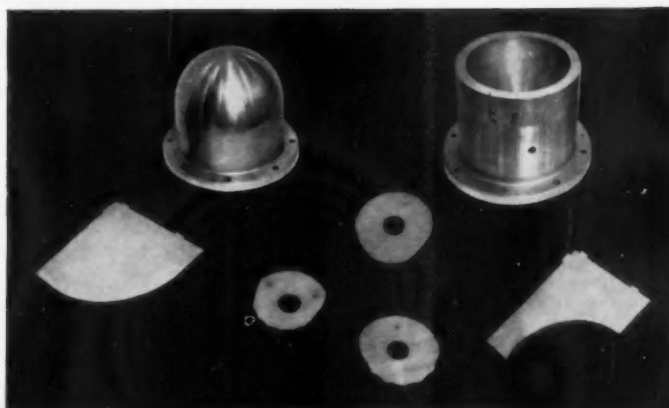


◀ By setting dial and pressing button either slide can be moved in increments ranging from .000025" to .10" with total movement of 18" on main slide and 26" on cross slide.



◀ Operation is monitored by electronic "Nixie" counting tubes and by direct-reading optical vernier. This mechanical and electronic read-out combination gives "closed loop" accuracy control during all operations.

Numera-Trol Contouring Machine simplifies production of parts with complex contours, ends need for blueprints and models, permits fabrication of prototypes and production parts directly from designer's mathematical directions. ▼



with the world's most accurate production machine tool!

EX-CELL-O NUMERA-TROL

59-71



"A Guidebook to Numerically Controlled Machine Tools," a valuable addition to your technical reference library, is available without cost from your local representative, or by writing direct to Ex-Cell-O.

**FREE—
NUMERICAL
CONTROL
GUIDEBOOK**



EX-CELL-O
FOR PRECISION

EX-CELL-O
CORPORATION
DETROIT 32, MICHIGAN

*Machinery
Division*

EX-CELL-O PRECISION PRODUCTS INCLUDE: MACHINE TOOLS • GRINDING AND BORING SPINDLES • CUTTING TOOLS • RAILROAD PINS AND BUSHINGS • DRILL JIG BUSHINGS • TORQUE ACTUATORS • THREAD AND GROOVE GAGES • GRANITE SURFACE PLATES • AIRCRAFT AND MISCELLANEOUS PRODUCTION PARTS • DAIRY EQUIPMENT



NAME IT...B-L-C WILL DO IT!

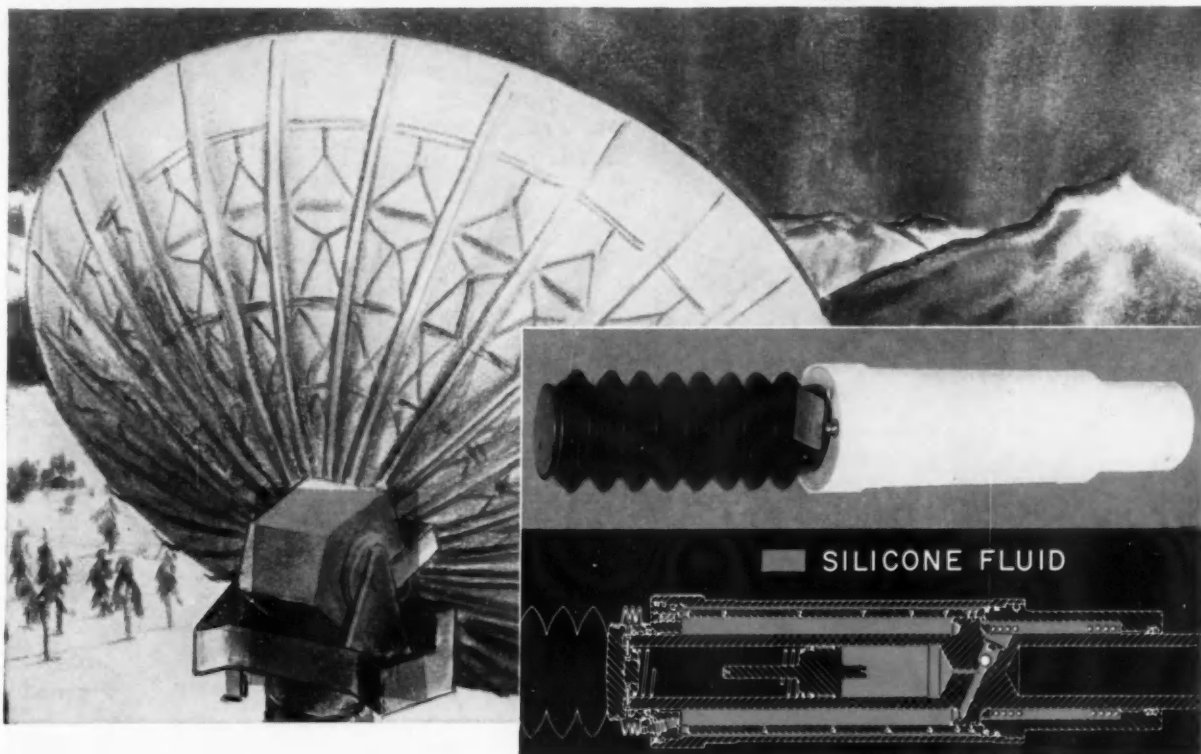
Grab your hat, tuck your specs under your arm . . . and head straight for Brown-Lipe-Chapin! Whether it's a massive part or intricate design, your requirements will be met with exacting precision. We can make giant die castings, process most any metal part to your specifications and also deliver top-quality bright work that is now used on today's leading ranges, refrigerators and washers, as well as for some of America's finest automobiles. We can also help improve your product's quality, cut your production time, keep costs to a minimum. Your product can be stamped, pressed, die cast, rolled or stretch bent—then polished, plated, anodized, painted and shipped to meet your schedules from either of our plants at Elyria, Ohio, or Syracuse, New York. And our experienced engineers guide your job every step of the way! For full information, call or write Customer Services, Brown-Lipe-Chapin, Syracuse, N.Y.



RELIABILITY by **BROWN · LIPE · CHAPIN**

DIVISION OF GENERAL MOTORS CORPORATION

Silicones Soak Up Shock



Dow Corning Damping Fluids Unaffected by Cold, Heat, Time

"Steady-state" fluids — that's what some engineers call these exceptionally stable damping media. And steady they are. Their useful range extends from as low as -100 F on the cold side to over 400 F on the hot side! Within these extremes, viscosity varies but little. They're resistant to oxidation and to breakdown under shear; won't sludge; won't corrode metals. Because of such properties, silicone fluids are highly effective media for damping, springing and torque converting.

Illustrated above is one example. It's a Radar Antenna Buffer, designed and built by Houdaille Industries, Buffalo, N. Y. Radar equipped with this unit, "Has silicone; won't over-travel." For that's where the buffering comes in. When the antenna swings to its travel limit, something must give, or the structure may be shock-damaged. What "gives" is the Buffer, and the working medium is Dow Corning silicone fluid. Because the damping fluid's viscosity is unaltered by temperature changes, performance of the Buffer varies less than 1% per 100 Fahrenheit degrees. That's important, because installations of ballistic missile early warning radar, which use the Buffer, may vary from tropic to Arctic.

This is but one of many designs where silicone fluids have aided the product engineer. Others include auto fan drives, aircraft oleo struts, missile accelerometers, and truck scales. If in your design you require a high performance damping or coupling fluid, investigate Dow Corning Silicones . . . the fluids with "steady-state" viscosity. Write to Dept. 0604 for more detailed information.

TYPICAL PROPERTIES OF DOW CORNING 200 FLUID*

| Centistokes at 25 C | Pour Point, °F | Visc/temp. ¹ Coefficient | Coeff. of Expansion cc/cc/°C |
|---------------------|----------------|-------------------------------------|------------------------------|
| 10 | -85 | 0.57 | 0.00108 |
| 50 | -67 | 0.59 | 0.00104 |
| 100 | -67 | 0.60 | 0.00096 |
| 500 | -58 | 0.62 | 0.00096 |
| 1,000 | -58 | 0.62 | 0.00096 |
| 12,500 | -51 | 0.58 | 0.00096 |

*Available in a range of viscosities to over a million centistokes.

1 — Viscosity at 210 F
Viscosity at 100 F

Your nearest Dow Corning office is the number one source for information and technical service on silicones.



Dow Corning CORPORATION
MIDLAND, MICHIGAN

ATLANTA BOSTON CHICAGO CLEVELAND DALLAS LOS ANGELES NEW YORK WASHINGTON, D. C.



*Cantilever suspension ala
Mather . . . about 200 B. C.*

**LET
MATHER
SOLVE
YOUR
SUSPENSION
PROBLEMS,
TOO**

It's pretty sneaky of us to infer that Mather was in business during Hannibal's day . . . we're not quite that old.

We're pioneers in suspension, though, and feel as old as Methuselah (experience-wise).

Maybe this and our research, design and manufacturing facilities can be helpful to you. We're "ready and willing, so just let us know".

MATHER

THE MATHER SPRING COMPANY

TOLEDO, OHIO



Where the Shift-Ratio Per Mile Is High,
the shift is to **LIPE CLUTCHES**



Stop-and-go ... creep-and-crawl ... uphill-downhill ... wherever the overall frequency of shifting is high, it's hard to keep clutch maintenance costs low.

Fleet operators know it's not the number of miles per year that put a clutch to the cost test. It's the *number of engagements per mile*.

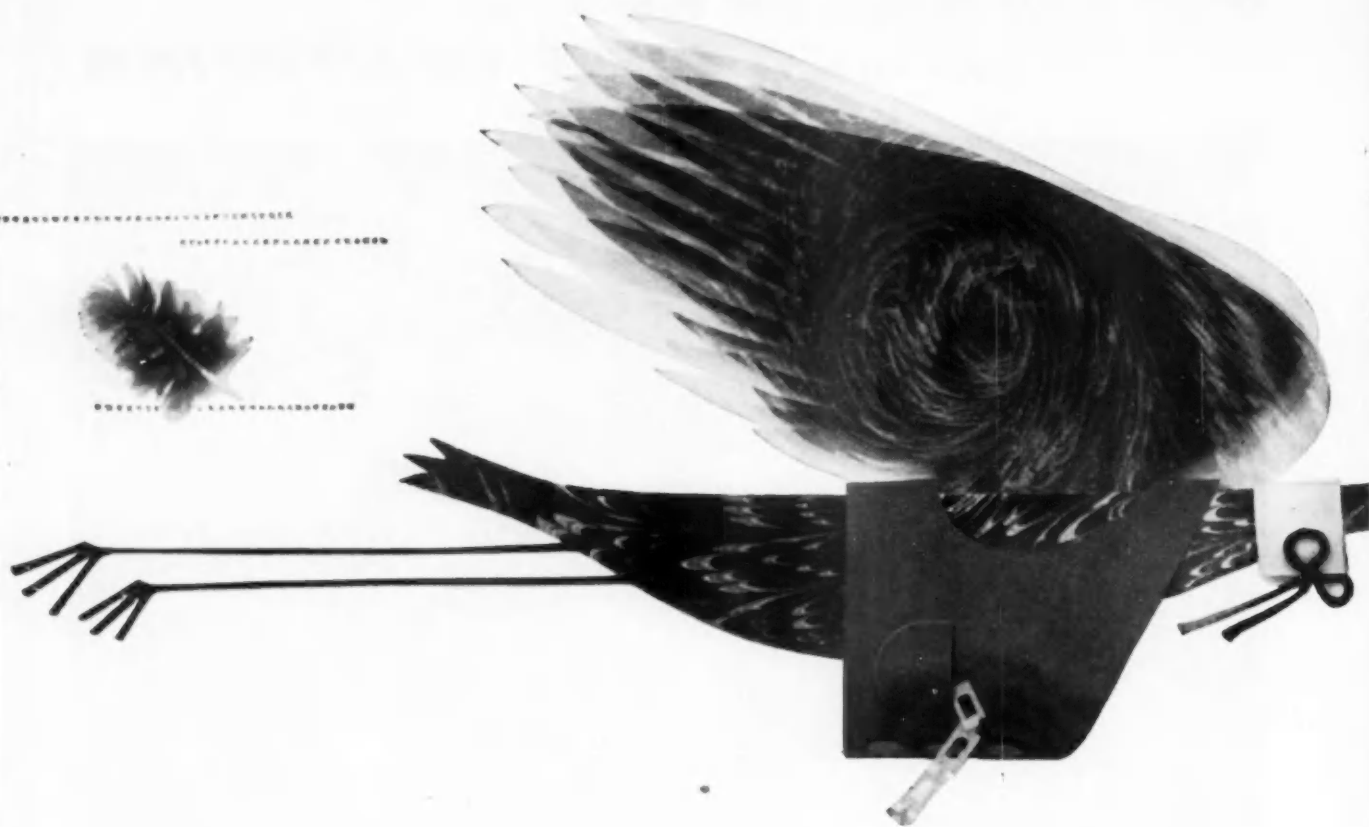
That's why so many operators are converting entire fleets to Lipe Heavy-Duty DPB Clutches ... both on new trucks and as replacements of original equipment.

They're *buying Lipe*. Why not *sell* them Lipe ... either as original or optional equipment? Customer response will prove to you ... *the trend is to LIPE*.



For more ton-miles and more engagements between shop-stops, equip with Lipe Heavy-Duty DPB Clutches: single and two-plate types; 12", 13", 14" and 15" sizes; torque capacities from 300 to 1900 ft.-lbs.





BUHR'S "BABY".....

The first major equipment built to the Special Machine Tool Standards is on the way. And it's Buhr's Baby! A lift-and-carry type transfer that will perform 323 precision operations, Buhr's

Baby will be the most flexible and readily convertible multiple operation machine tool ever built. Manufacturing was started in December. Future ads will keep you posted on progress.

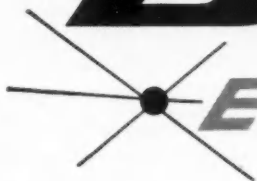
BUHR MACHINE TOOL COMPANY • ANN ARBOR

Report to the SMTS Committee



is
...on the
way!

MICHIGAN



BUHR
ECONOMATIC

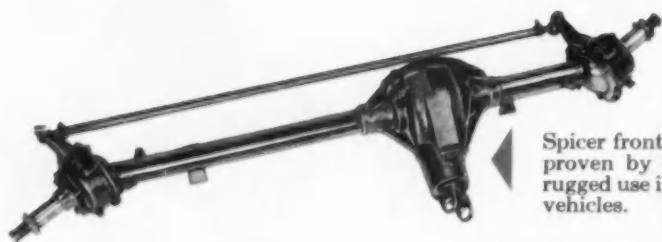
AUTOMOTIVE INDUSTRIES, April 15, 1960

Circle 122 on Inquiry Card for more data

With Power-Matched Your Trucks Will Lick

Only Spicer provides the operating advantages of power-matched design, because only Spicer designs and manufactures *complete* 4-wheel drive assemblies for light and medium-duty trucks. The Spicer name on both front and rear driving axles, transfer case, drive shafts and universal joints means maximum power and efficiency.

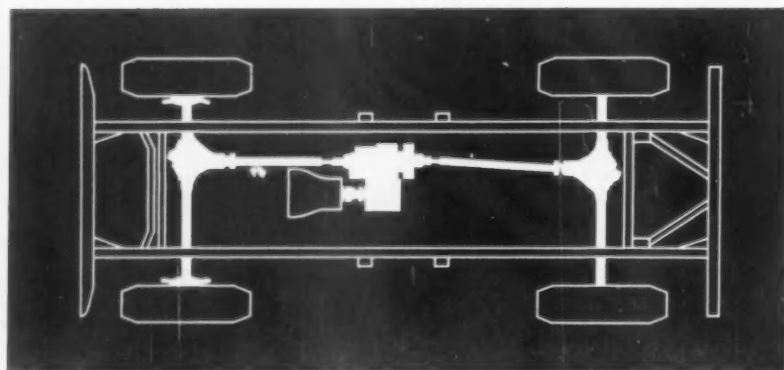
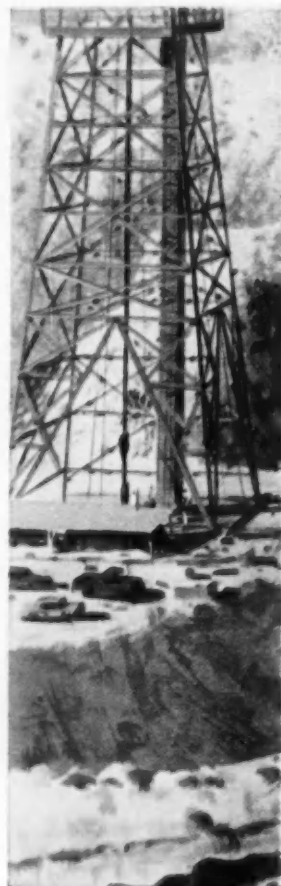
Specify Spicer for 4-wheel drive units, for maintenance-free performance, and for immediate parts availability—anywhere in the country!



Spicer front drive axles have been job-proven by over a quarter-century of rugged use in both civilian and military vehicles.



Special Spicer rear axle design and construction assure precision alignment of gears and bearings at all speeds and load conditions for quieter operation.



Power-Matched . . . Spicer *complete* four-wheel drive assemblies are designed to work together for dependable, full power traction.

Spicer 4-Wheel Drives The Toughest Terrain!



*WRITE Dana for further information on 4-wheel drives.
Please describe your application and include load data.*



DANA

CORPORATION

Toledo 1, Ohio

Serving Transportation—Transmissions • Auxiliaries • Universal Joints • Clutches • Propeller Shafts • Power Take-Offs
Torque Converters • Axles • Powr-Lok Differentials • Gear Boxes • Forgings • Stampings • Frames • Railway Drives

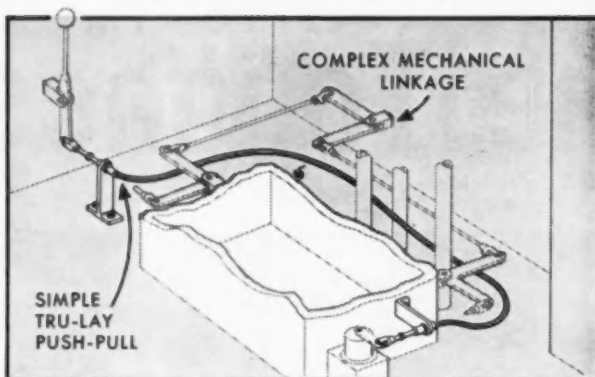
Many of these products are manufactured in Canada by Hayes Steel Products Limited, Merriton, Ontario

AUTOMOTIVE INDUSTRIES, April 15, 1960

Circle 123 on Inquiry Card for more data

TRU-LAY ~~PUSH-PULL~~ CONTROLS PROVIDE ACCURATE, DEPENDABLE REMOTE CONTROL FOR HUNDREDS OF PRODUCTS

• If your products involve remote control—electrical, hydraulic, pneumatic or direct—TRU-LAY PUSH-PULL FLEXIBLE CONTROLS can help solve your design problems. They provide positive remote control over long or short distances—up to 150 feet from the control point. Because they operate while flexing, they can snake around obstructions. They will not buckle. They are ruggedly constructed, easily installed and operated, sealed against dirt and moisture, and will handle jobs with as much as 1,000 lbs. input. PUSH-PULL CONTROLS are simple, have but one moving part, are noiseless, and give a lifetime of accuracy. Mechanical linkages, on the other hand, are complex. Unlike PUSH-PULL CONTROLS, they are made of many parts, wear at many points, and produce increased backlash, lost accuracy, and vibration rattles.



Sizes and Operating Heads to Fit Your Design

| Control Dimension | Minimum Recommended Radius in Inches | Maximum Input Load in Pounds (Dependent on Travel) |
|-------------------|--------------------------------------|--|
| $\frac{3}{32}$ " | 2 | 30 |
| $\frac{1}{8}$ " | 3 | 65-125 |
| $\frac{3}{16}$ " | 5 | 115-175 |
| $\frac{1}{4}$ " | 6 | 300-600 |
| $\frac{5}{16}$ " | 8 | 700-1,000 |

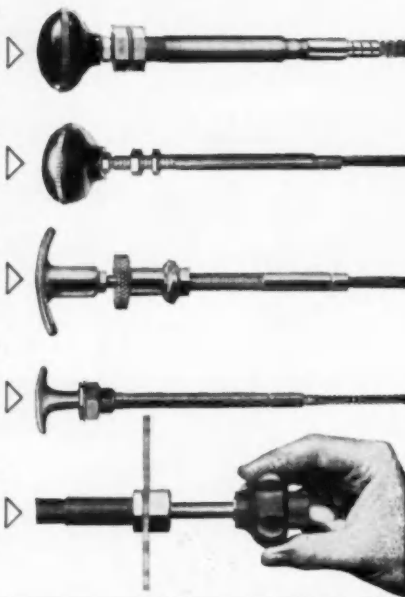
Heavy Duty • For use where rugged duty prevails, but where operation must be smooth and accurate. Meets all requirements for dependability and life.

Light Duty • Gives smooth, accurate and dependable performance at low cost. Available with your choice of several types of knobs.

Selective Friction • Amount of friction can be changed to meet individual requirements of the operator or application. Friction constant at any setting.

Position Lock • A slight turn of the T-type handle locks the control in any position. Available in two sizes for light and heavy-duty applications.

Micro Control • Push or pull the knob for instantaneous response, then rotate knob for vernier adjustment. Built for smooth, efficient operation on any job.



PUSH-PULL DATA FILE shows how to simplify, improve design

PUSH-PULL CONTROLS are solid as a rod and flexible as a wire rope. They're factory-lubricated for life, unaffected by temperature extremes, and can be adapted to practically any application. For complete details on how you can use them, write for the PUSH-PULL DATA FILE. It contains 7 engineering Bulletins which describe in detail the operation of PUSH-PULL CONTROLS, their applications, features and advantages. Our engineers will be glad to help you make TRU-LAY PUSH-PULL CONTROLS a part of your product.

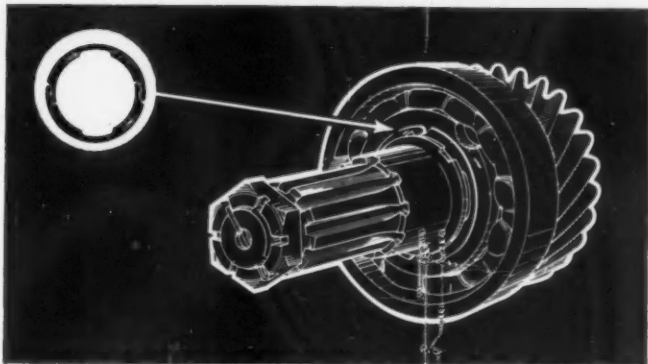
PUSH-PULL CONTROLS

Automotive and Aircraft Division • American Chain & Cable Company, Inc.

601-H Stephenson Bldg., Detroit 2

6800-H East Acco Street, Los Angeles 22 • 929-H Connecticut Ave., Bridgeport 2, Conn.





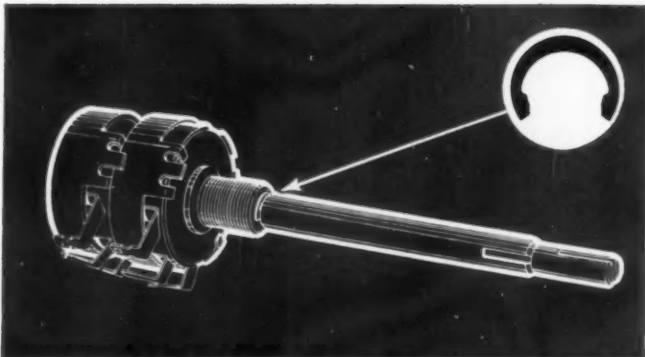
Heavy duty transmission design simplified. On this dual axle drive for trucks, a Truarc Series 5107 ring locks bearing on drive shaft. Interlocking ring design won't dislodge under heavy torque . . . is also recommended for high rpm. applications.



Rings replace machined shoulders, collars, set screws. That's what original design of this pneumatic temperature transmitter called for. Series 5139 Prong-Lock® ring with bowed design compensates for accumulated tolerances in parts, provides sufficient friction to prevent rotation under vibration. At the same time two Waldes E-rings position and lock adjustment screw to face plate.



Reinforced aluminum ring gives design advantages on louver windows. Waldes Truarc Series 5144 reinforced rings of aluminum secure hinge pins, eliminate costly riveting in linkage of louver type window. Ring design provides large bearing shoulder. Reinforced construction has 5 times the gripping strength of standard E-ring construction, allows use of non-corrosive aluminum.



Ring acts as locking shoulder. Holding the threaded ferrule on this potentiometer shaft is a Truarc Series 5103 Crescent® ring. Crescent ring design with low shoulder provides ample clearance for assembly of panel locknut. It is less costly than a machined shoulder, more effective, quicker to install, easier to remove than the C washer previously used.

Designing with radially assembled Waldes Truarc retaining rings

**solve varied product design problems—save
machining, materials, parts and labor**

Radially assembled retaining rings, which snap onto a shaft at right angles to its axis, greatly extend the range of products on which retaining rings may be used to simplify design and save parts or labor costs.

For example, rings for radial assembly can be used in applications where it is impossible to install a ring axially over the end of a shaft. Certain types are designed to accommodate shafts of relatively wide tolerances. Others described below may be used to provide a sizeable shoulder on a shaft.

The four applications shown here provide an indication of the wide range of products using radially assembled rings. The rings themselves are basic Truarc types each having specific design features. The high shoulder of one provides a large bearing surface on small diameter shafts; the low shoulder of another is ideal where clearance is limited. A third has an interlocking design which prevents it from being dislodged under torque or high rpm. A fourth can be used against rotating parts at the same time it provides spring tension.

These are but four of Truarc's fifty functionally different types of retaining rings with up to 97 sizes within a single type, six metal specifications and thirteen different finishes. Special hand, magazine, and semi-automatic applicators as well as grooving tools are also available to speed production. The entire line, together with over 70 typical applications, is described and illustrated in the new catalog RR10-58—yours for the asking. And call on us for design assistance on your specific project . . . a Waldes Truarc engineer will be glad to help. Waldes Kohinoor, Inc., 47-16 Austel Place, Long Island City 1, N. Y.

© 1959 WALDES KOHINOOR, INC. D. 9



**WALDES
TRUARC®
RETAINING RINGS**

Waldes Kohinoor Inc., Long Island City 1, N. Y.

TRUARC RETAINING RINGS...THE ENGINEERED FASTENING METHOD FOR REDUCING MATERIAL, MACHINING AND ASSEMBLY COSTS



M&T "Duplex Chromium"
makes this difference
in CASS tests

Zinc die cast panels after
272 hours CASS tests.
Both had same copper and
dual nickel undercoats.

Left panel, plated with 0.01
mil ordinary chromium
gets ASTM rating of 0.

Right panel, plated with
0.10 mil "DUPLEX CHROMIUM"
still rates a perfect 10.



The thicker the "Duplex Chromium" ...the longer the plating lasts

THE hours that plated samples survive in CASS* tests indicate the life expectancy of the parts in actual outdoor use. Results obtained with this modern, severe corrosion-testing technique prove that M&T "DUPLEX CHROMIUM" radically increases protection. They further show that the *thicker* the chromium plate the *longer* the finish lasts.

Here then is the best way to upgrade durability of decorative, chromium plated automotive and other steel and zinc die cast parts. You'll get a dramatic improvement with a thickness of 0.05 mil M&T "DUPLEX CHROMIUM." And you can provide even more remarkable service life by depositing 0.10 mil.

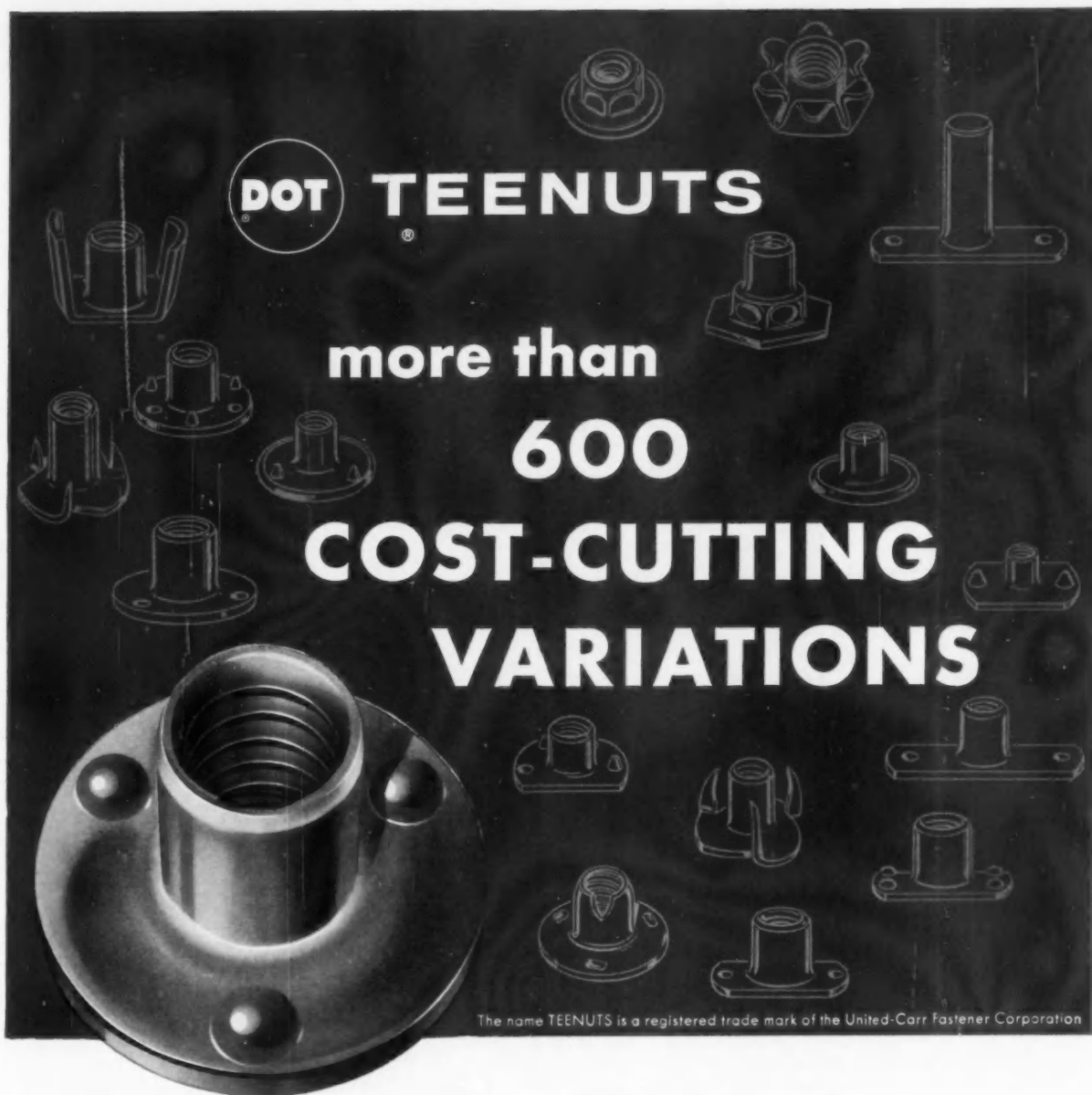
For plating thicker chromium, Unichrome SRHS® (self regulating high speed) Chromium baths have no equal. They alone give the right *type* of deposit. They not only speed production but also simplify it. M&T "DUPLEX CHROMIUM," using two of these baths, consists of a layer of Crack-Free Chromium topped by another special layer of SRHS® Chromium that minimizes localized corrosion due to tiny imperfections in the basis metal. The Crack-Free Chromium also assures more uniform distribution of the plating, so that recesses, too, get amply thick deposits without graying or burning on edges. Write for technical data or for an M&T plating engineer.

*Copper accelerated acetic acid salt spray test



plating products • welding products
coatings • metals • chemicals

METAL & THERMIT CORPORATION, General Offices: Rahway, New Jersey



DOT TEENUTS

**more than
600
COST-CUTTING
VARIATIONS**

The name TEENUTS is a registered trade mark of the United-Carr Fastener Corporation

Since the first TEENUT was developed by Carr Fastener in 1927, more than 600 different modifications of this extremely versatile device have been designed and manufactured in true, mass-production quantities.

By combining nut and washer in one solid unit, the DOT TEENUT offers exceptional strength and security and eliminates the need for tapping. Its flanged base can be formed with welding bosses for attachment to sheet or solid metal structures . . . with prongs for wood . . . or with any number of different special bases for particular applications. DOT TEENUTS can be made in heat and corrosion-resistant materials and they can be provided with moisture-seals and vibration-proof,

self-locking barrels.

Once mounted, the DOT TEENUT stays put and can't be lost or mislaid . . . an advantage at any time and a necessity where blind fastening is required.

Wide experience in the proper application of DOT TEENUTS and a multitude of other special-purpose fasteners enables your DOT field representative to provide prompt and effective solutions to a tremendous variety of fastening problems. Where special design work is needed, he can bring you the services of a design-engineering group unequalled in its field.

The DOT TEENUT catalog is an invaluable reference . . . yours on request.



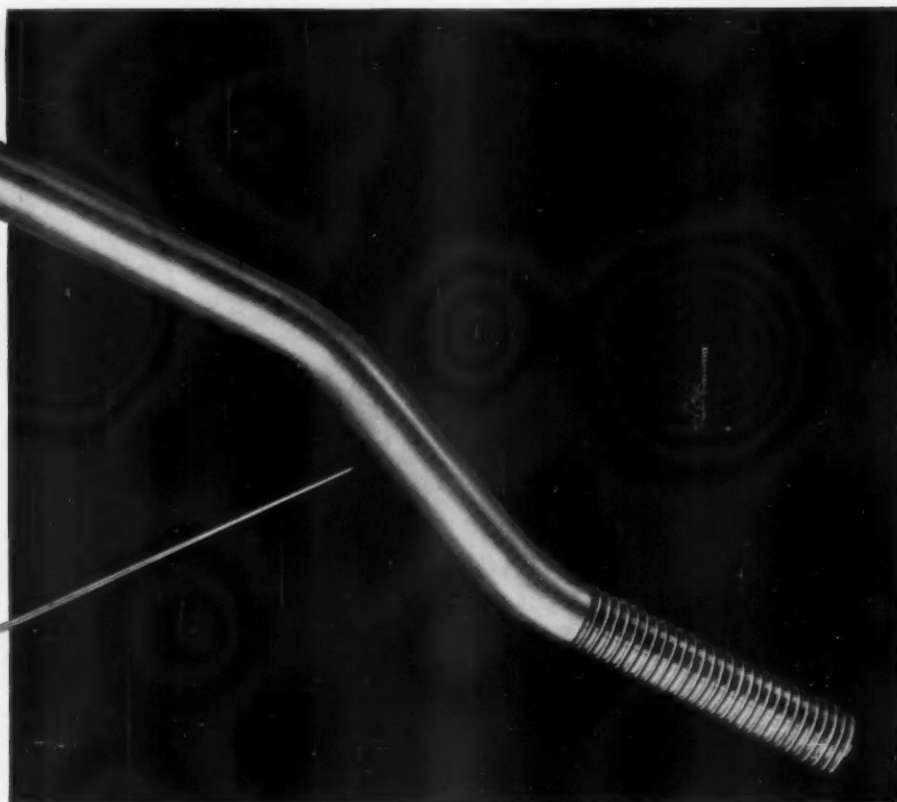
CARR FASTENER COMPANY

Division of UNITED-CARR Fastener Corp., Cambridge 42, Mass.

Offices In:

Atlanta, Boston, Chicago, Cleveland, Dallas, Detroit, Los Angeles, New York, Philadelphia, Syracuse

NAT'S
quick facts
about
Fasteners...



Shining example...of big things in specials by National

This is a large offset eyebolt, shown here big as life. We designed and made it to order for one of our customers.

To begin with, it shows that we can and do make some sizable things in the way of cold headed Special Products.

But there's more here than seems to meet the eye.

When our customer brought us this eyebolt, he had been having it made as a forged eye welded to a machined bolt, with a cut thread.

We gave it some thought, then made it... with a difference. We cold formed it in one piece, and rolled the thread... turning out a stronger, more practical, and more efficient part, and lopping off costs all along the line.

And there's the real point... what we

really mean when we mention doing BIG things in Specials, at National... better parts, large or small, at lower cost, by cold heading and designing for profit.

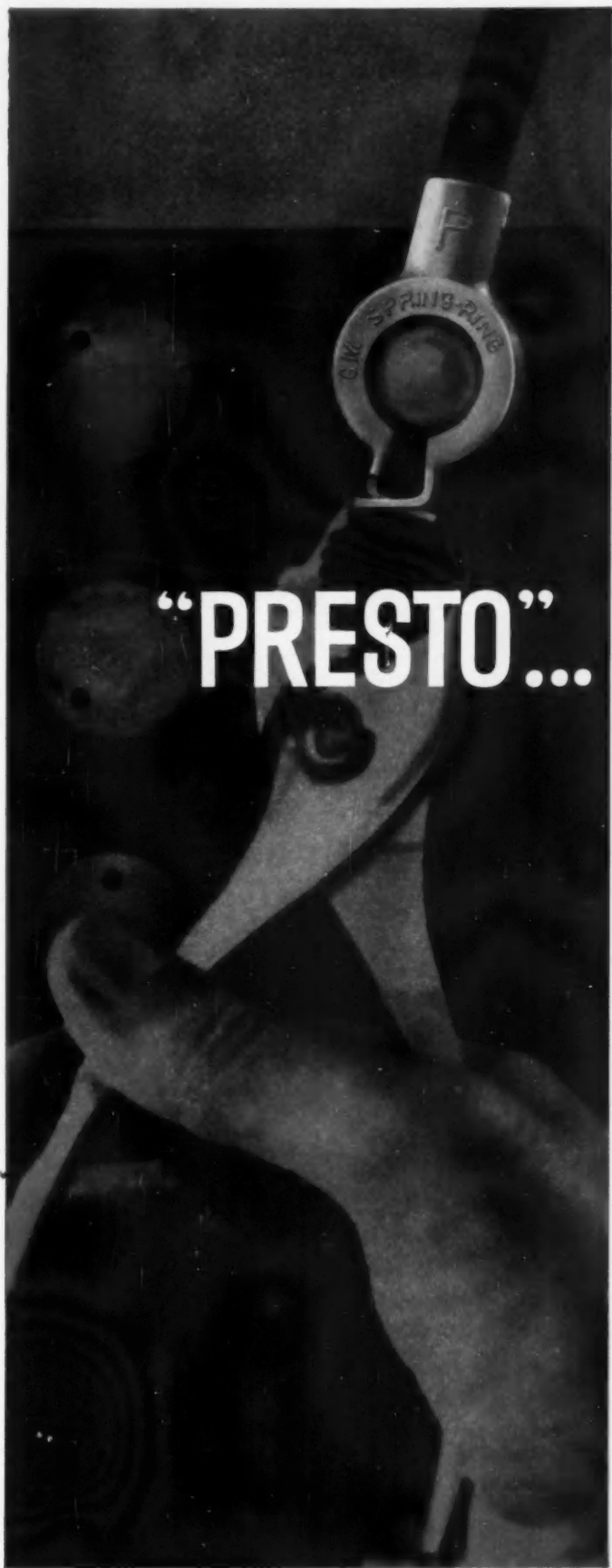
We do it right along, and we can very likely do it for you, too. Want to find out? Just drop a note to Special Products Service, at our address*. And if you just happen to have a Special problem, tell us all about it—and let us help.

*It will bring you this illustrated booklet "Bring your Special Problems to National", 16 pages about Specials as National sees them.



The National Screw & Mfg. Company • Cleveland 4, Ohio

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“PRESTO”...

and it's on!

Packard “SPRING-RING” Battery Cables Save Time, save money and require no special tools. What's more, they are easier to install and remove. A squeeze with a pair of pliers and they're on, providing a high pressure contact!

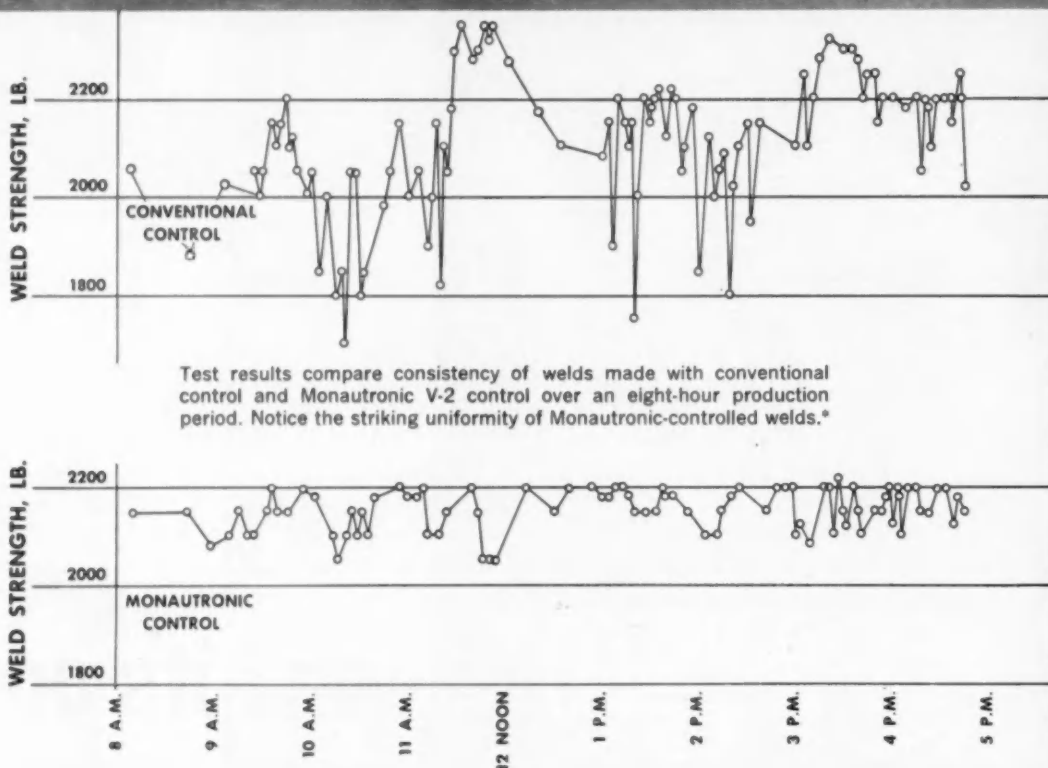
- Because they are smaller than conventional terminals, there is less chance of interference with battery filler caps and hold-downs. Packard “SPRING-RING” battery cables are made for both positive and negative battery posts, and are original equipment on many 1960 General Motors cars. • For full details contact Packard Electric today. Branch offices in Detroit and Chicago.

Packard Electric

Warren, Ohio



“Live Wire” division of General Motors



new feedback control gives you consistently high quality welds... automatically



Monautronic V-2 welding control has fully automatic sequencing with all provisions for single spot, roll spot and seam welding.



The new *Monautronic V-2* welding control makes use of the latest advances in electronic computing to overcome automatically such obstacles to weld quality as line voltage fluctuation, electrode wear, variations in electrode tip force, surface finish and shunting.

The control compensates for undesirable variations usually encountered in resistance welding by maintaining voltage across a weld at a constant value. This constraint of voltage amounts to constraint of final weld temperatures, and such temperature control assures uniform production of high quality welds.

Any metal that can be resistance welded can be welded better with the Monautronic V-2 than with any other control on the market.

For complete details, contact THE BUDD COMPANY, Electronic Controls Section, Philadelphia 32, Pa., or one of our regional offices.

*Case study upon request.

2450 Hunting Park Ave.
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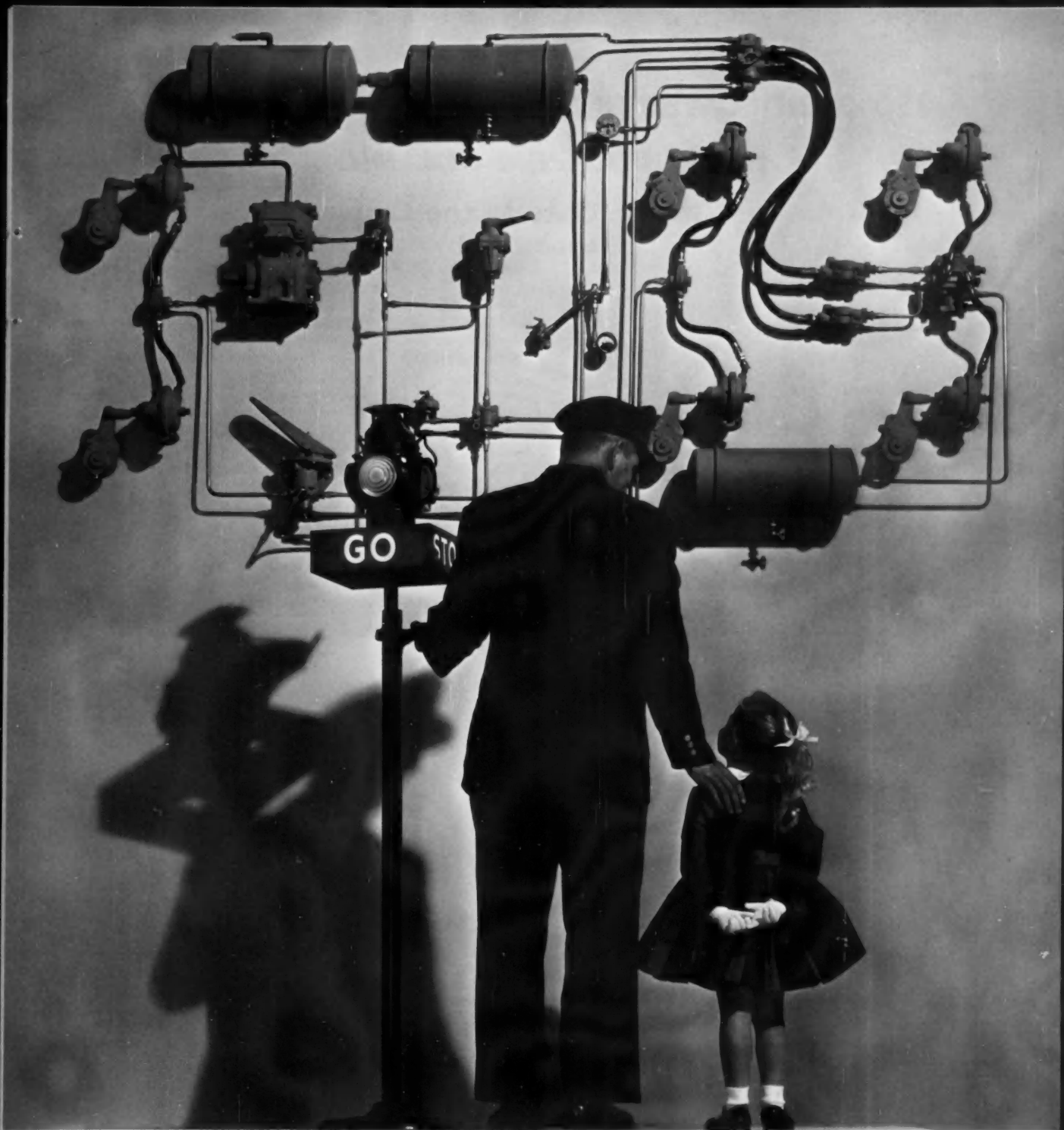
12141 Charlevoix Ave.
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ELECTRONIC **Budd** CONTROLS

Circle 130 on Inquiry Card for more data

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"SYSTEMATIC" DEPENDABILITY . . . the efficient officer employs an orderly, on-the-job system that spells dependability. Bendix-Westinghouse Air Brakes mean on-the-job braking dependability for the country's transport industry. The reason for this is that all components are designed and engineered to work together as a system. Result is the greater long-range safety, economy, and dependability that have made Bendix-Westinghouse Air Brake Systems first choice of the nation's fleet operators and vehicle manufacturers. For the surest stops available, make it Air Brakes by Bendix-Westinghouse.

SPECIFY COMPLETE AIR BRAKE SYSTEMS BY

Bendix-Westinghouse



450 BENDIX-WESTINGHOUSE DISTRIBUTORS

HELP KEEP 'EM ROLLING

—from the Golden Gate to the Empire State



Wherever your trucks travel, there is a Bendix-Westinghouse Authorized Distributor near at hand to serve your needs. Staffed with trained air brake experts, this nation-wide network is equipped to help you keep 'em rolling.

Through the Bendix-Westinghouse Repair Exchange Service, for example, your distributor offers you the finest factory rebuilding program in the industry. Under it, you can exchange equipment worn or damaged from long service for factory-rebuilt devices warranted the same as brand-new units and including the latest engineering

improvements. Result: you get new-unit operating efficiency at low cost per mile.

Every distributor also carries a complete stock of genuine Bendix-Westinghouse parts—from the smallest fittings and gaskets to brand-new major components. Result: you get the service parts you need when you need them.

Finally, if your trucks, trailers or school buses are not now air-brake equipped, your distributor offers you a convenient way to convert to air with field installation kits. Result: you get all the benefits of air on your present non-equipped vehicles.

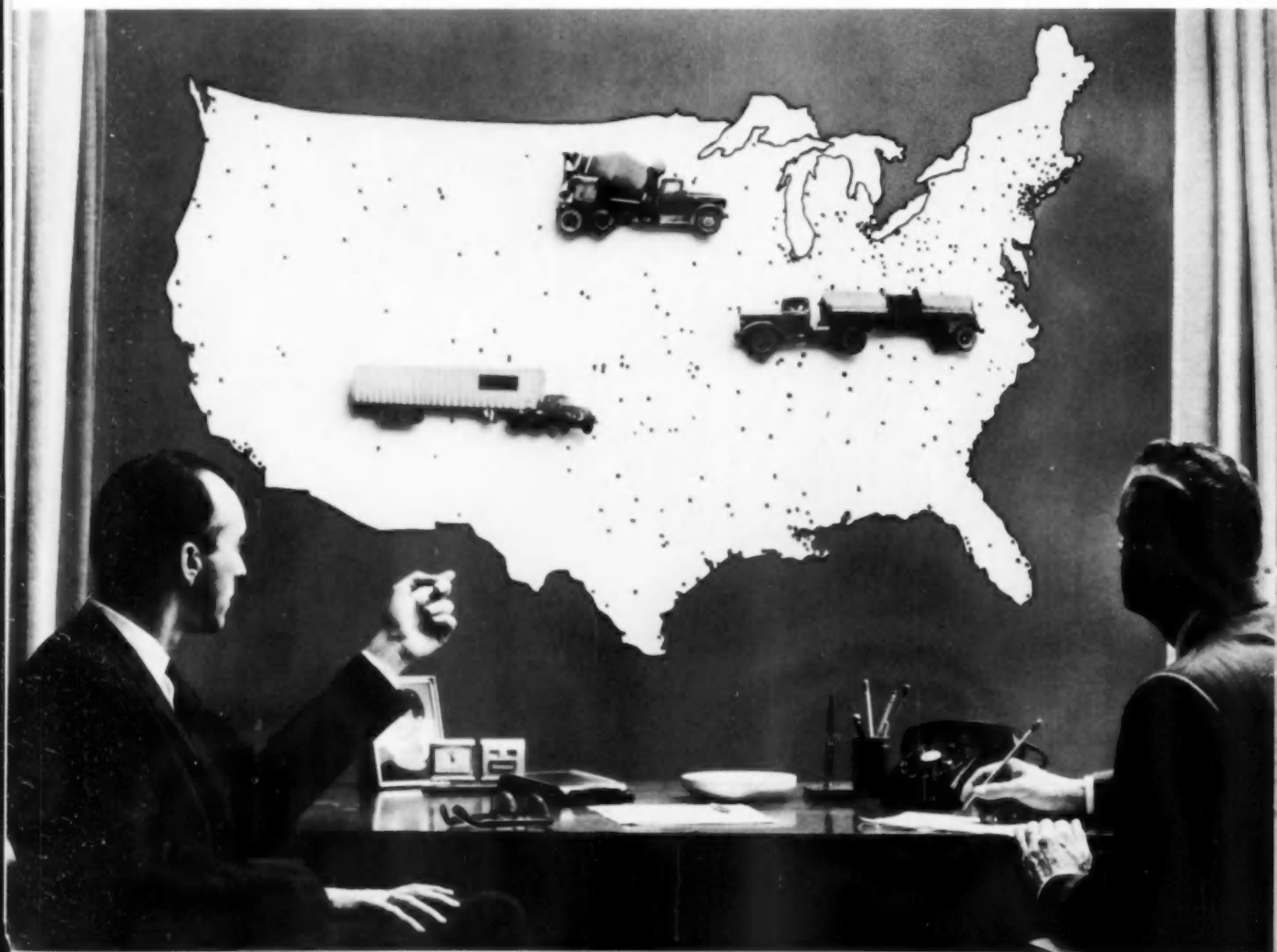
So rely on your Bendix-Westinghouse Authorized Distributor for the finest in service. Look for his sign in major transportation centers from coast to coast.

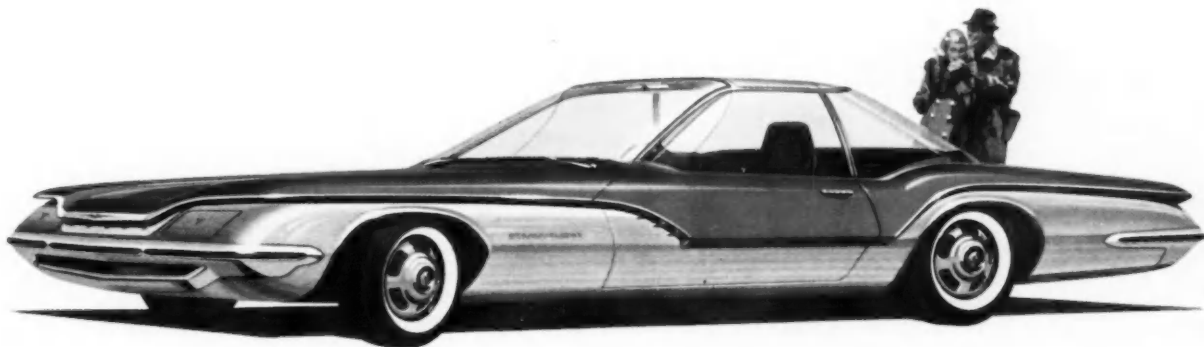


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AUTOMOTIVE AIR BRAKE COMPANY

General offices and factory—Elyria, Ohio. Branches—Berkeley, California and Oklahoma City, Oklahoma





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No other metal has the strength, beauty and versatile qualities that serve you so well today and promise so much for tomorrow.

**There is nothing
like stainless steel
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McLouth Steel Corporation,
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*Manufacturers of high quality
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Look for the **STEELMARK**
on the products you buy.

McLOUTH STAINLESS STEEL



MAGNESIUM

MAGNESIUM DELIVERS 4 TIMES MORE DIE CASTINGS *per pound than zinc!*

4 pounds of magnesium make . . .



4 pounds of zinc make . . .



Magnesium die castings have a long history of successful application in automobiles—and for several good reasons. You get more *volume* of lightweight magnesium per pound, thus you get more die castings per pound. Aluminum, for example, is 50% heavier—zinc and steel four times heavier—than magnesium. You save on production costs because magnesium can usually be die

cast 50% faster than aluminum. It can be machined faster, too.

If weight or time saving is *your* problem, check magnesium with your die casting supplier or write to: Automotive Development Engineering, Magnesium Sales Dept. 1100T4-15, THE DOW CHEMICAL COMPANY, Fisher Building, Detroit, Michigan.

A FEW EXAMPLES of the many automotive parts die cast of magnesium.

Instrument panels and bezel rings
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Engine Parts, including:
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Fuel pump cover
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NEWS

Vol. 122, No. 8

April 15, 1960

Record Sales in March Spring Spurt Makes 2nd Best Year Likely

By Hugh C. Quinn, Detroit Regional Editor
and C. B. Campbell, News Editor

March roared out like a lion in the automobile industry, with most of the roaring noises coming from the Sales Departments. Nearly every automaker had something good to report when the final figures were in for the month, and in several cases the big noise came in the form of a new record of one sort or another.

There were record months, record first-quarters and record 10-day periods. And if some companies were unable to report new records, they at least were able to shout about healthy increases over previous periods.

2 Encouraging Factors

Even though sales were not up to earlier expectations, the first-quarter results point to two very encouraging factors: One, the 1960 year will end up well ahead of last year and probably second only to 1955; and, two, that the March figures, with tremendous increases in the final third of the month, indicate a return of the elusive spring spurt.

It was the percentage gains that looked good. For example, Rambler sales were 39 per cent over a

year ago and about 32 per cent over the preceding period. Lark sales were 60 per cent over the preceding 10 days with a 27.8 per cent jump in the daily sales rate (the real clue to a sales trend). Lark, incidentally, had its best 10-

day period since the car was introduced in '58.

While Buick sales for the first three months ran slightly behind a year ago, a ray of hope flashed out of Flint with word of the final third of March. Sales of 10,354 cars were 75.5 per cent over the previous 10 days and 18 per cent ahead of last year.

Ford Sold 126,430

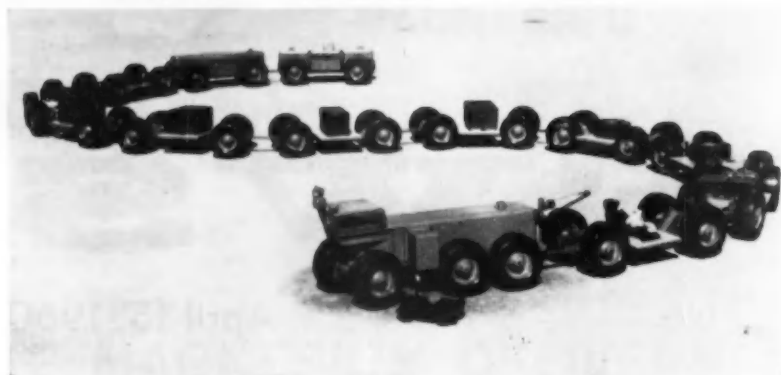
At Ford Div., the daily selling rate for Ford, Thunderbird and Falcon passenger cars averaged 5,450 a day during the final part of March. This, reports Ford, was

HANDCRAFTED ROVER '100'



Luxurious fittings are a feature of 1960 English Rover sedan. It has six-cylinder 104 hp F-head engine and optional overdrive. Many parts are handcrafted. New York p. o. e. prices start at \$3,795.

ARMY'S LARGEST LAND VEHICLE



Production has started at the R. G. LeTourneau, Inc., plant on a new type "overland train" that rides on 54, 10-ft high rubber tires. It consists of 13 cars and will be 560 ft long. It will be used in rugged, remote areas. Scale model shows how train dwarfs "jeep" and driver in foreground.

23 per cent ahead of the middle period and the highest since last November. Ford's March sales totaled 126,430 cars.

Rambler's record was reached with March sales of 37,205 cars and first-quarter sales of 100,466 units. In the first quarter a year ago, deliveries totaled 73,138.

Cadillac's month of March, with 14,126, set a new record for the month, passing March, 1955, when 13,619 were sold. The final 10 days of March, with 5,981 deliveries, was the best month-end period in history.

Chrysler Soaring

But perhaps the biggest sales story came from Chrysler, where sales in the final days of March totaled 41,827. This was the highest 10-day period since August, 1957, and it marked a 107 per cent increase over a year ago and a 72 per cent jump over the middle third of the month. March sales of 92,708 were 24 per cent over February and 68 per cent ahead of last year.

Chrysler, of course, still was feeling the effects of a glass supplier's strike in March a year ago, so comparisons with 1959 are a bit shaky. The corporation's sales have been climbing steadily during the 1960 model year.

Dodge sales in March (35,206) were the highest of any month since May, 1952, and 196 per cent above last year. Sales of 16,180 cars in the final third of March were 290 per cent ahead of last year and the highest, says Dodge,

since the 10-day reporting system was adopted in 1954.

Plymouth-Valiant sales also reflected the build-up during 1960, with the best month and 10-day period since August, 1957.

And so on. They all read pretty much alike. But Chevrolet's E. N. Cole sees in his sales figures a record-breaking year for Chevrolet, with Chevrolet holding up its share of a seven-million car year.

Robert J. Eggert, Ford market researcher, says the first quarter figures, projected and seasonally adjusted, point to 1960 total sales of 6.7 million cars, including 500,000 imports.

1963 Road Show

The Construction Industry Manufacturers' Association has an-

4 Chrysler Entries Win Economy Test

Chrysler Corp. entries were victorious in four of the six classes in the 1,061-mi. 1960 Mobilgas economy run from Los Angeles to Minneapolis.

A Rambler won in the compact class, averaging 28.3 mpg. Other victors were Plymouth Savoy, 24.8 mpg; Plymouth Belvedere, 22.8 mpg; Studebaker Hawk, 22.9 mpg; Chrysler New Yorker, 20.8 mpg, and a Chrysler Imperial, 20.5 mpg.

nounced its Road Show will be held in February, 1963, in the International Amphitheatre, Chicago.

Word on GM Compacts Is Expected Shortly

Official confirmation of General Motor's forthcoming B-O-P compact cars is expected within a few weeks. Dodge Div. General Manager, M. C. Patterson, already has confirmed that Dodge will build and market a new compact as a 1961 model.

With an earlier-than-usual model changeover coming this year, work on the new compacts will pick up speed in coming weeks. As the tempo of tooling, prototypes and pilot production quickens, the official word cannot hold back much longer.

Dodge's Lancer will be built on the Valiant body, with a 106.5 in. wheelbase. The B-O-P compacts, as reported earlier, will share certain components with Corvair but will be more distinctive.

Army Tests Device To Cut Exhaust Fumes

Californians and others may be able to use a new exhaust afterburner to reduce the amount of unburned hydrocarbons from automobile engine exhausts. The new device, known as Monoxit, was developed by Norton Portland Corp. of Portland, Me., for use on Army personnel carriers.

Monoxit can be attached directly to the exhaust manifold. Air is pumped into the exhaust and a ceramic chamber where a battery-powered glow-plug burns off excess hydrocarbons and carbon monoxide.

Norton Portland reports the device, which weighs but a few pounds, is relatively inexpensive. The firm says the Monoxit is now undergoing final Army Ordnance tests.

Autolite Seeking New Auto Products

Acquisition of companies in an effort to diversify will continue to be a main objective of the Electric Autolite Co., R. H. Davies, president, has told stockholders in the annual financial statement for 1959.

Mr. Davies said Autolite has been seeking concerns that produce complementary automotive products that will strengthen and broaden present product lines and companies whose business is not related to the automotive field.

Net sales for 1959 amounted to \$201.6 million, an increase of 19 per cent over 1958 net sales of \$168.9 million. This was equal to \$6.45 a share as compared with \$1.79. While automotive original equipment accounted for the major portion of the increase in sales, larger percentage gains were reflected in the replacement, defense and export sales classifications.

In 1959, original equipment sales totaled \$117.4 million while in 1958 they were \$99.9 million. Replacement sales last year were \$63.6 million as against \$52.9 million in 1958. Defense sales increased from \$12.4 million to \$15.9 million and exports rose from \$3.5 million to \$4.6 million.

Acquisition of C & D Batteries, Inc., of Conshohocken, Pa. and an addition to the Vincennes, Ind., battery plant were major items in the addition of \$5.2 million to the property, plant and equipment accounts.

800,000 Shareholders Revealed by GM

General Motors is broadening its base as well as its product line. The giant corporation now counts

more than 800,000 shareholders, more than any other industrial corporation in the world.

And, at latest count, GM was buying production materials and services from more than 27,500 American businesses, most of them in the "small business" category with fewer than 100 employees.

GM has added some 300,000 shareholders in the last five years. Stockholders are spread over 80 foreign countries, as well as every state of the Union.

The latest supplier survey shows an increase of nearly 2000 firms since the '57 survey. In 1959, there were nearly 20,000 businesses selling to GM who counted fewer than 100 employees, and 12,300 of these firms had fewer than 25 employees. Goods and services accounted for 48.5 cents out of every sales dollar, or \$5.5 billion.

VW Studies Increase In Power, New Model

Volkswagen has a new model ready when demand warrants.

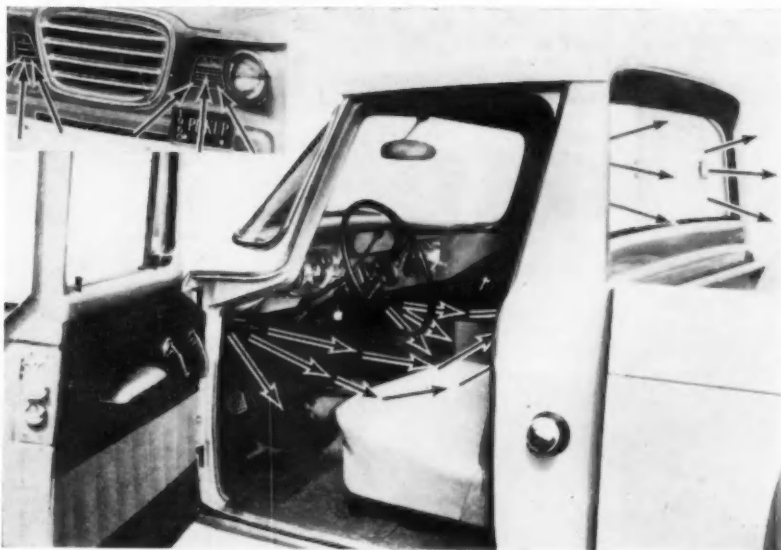
Dr. Heinz Nordhoff, Volkswagen general manager, revealed eventual change of the VW at the opening of the Geneva Motor Show in Switzerland.

"Demand is still exceeding supply," Dr. Nordhoff said, "and we plan to step up production of current models from 3,000 to 4,000 a day."

Dr. Nordhoff indicated the next VW move might be increased horsepower. The VW is powered by a 36 hp engine.

"We have plenty in reserve in our engine," he said. "If there is a trend toward increased power in cars in the Volkswagen class, we will have no difficulty stepping up our power."

UNIQUE CAB VENTILATION



An exclusive feature of Studebaker's new Champ pickup truck is the ventilation system. Twin currents of air enter vents at front (inset, upper left), pass over front seat and out rear window equipped with two sliding panels.

NEWS

CONTINUED

Japan's Auto Output Tops Quarter Million

Japan's booming automotive industry topped the quarter million figure in production units for 1959, according to figures just released.

The authoritative Automotive Industrial Association reported that a total of 262,814 units rolled off assembly lines in the past calendar year. An increase of at least 100,000 units is predicted for 1960.

Output for 1959 included 78,598 passenger cars; 177,485 trucks, and 6,734 buses. Of the total, 19,284 were exported. Exports included 4,884 cars; 13,958 trucks, and 442 buses.

More than half the exported passenger autos went to the U. S. while Southeast Asia and the Middle East were the major bus and truck markets.

Today, there are at least two dozen companies producing automobiles, trucks, buses, three-wheel light trucks and motorcycles.

The Automotive Industrial Association estimates that total production will reach 385,000 units this year. This will include 125,550 passenger cars; 251,450 trucks, and 8,000 buses. Of these, 25,000 units will be exported, of which 10,550 will be passenger vehicles.

Fruehauf Trailer Has Record Net

A record 1959 net of \$12.9 million, or \$1.92 a share, was reported by Fruehauf Trailer Co. This compared with net loss of \$5.4 million in 1958.

Sales of \$249.6 million in 1959 were second highest in the company's history and were only topped by 1956 sales. Net sales in 1958 were \$210.4 million.

Chairman Roy Fruehauf said the 1959 record was accomplished by "product standardization, improvements in engineering and production techniques, better expense controls and adoption of employee incentive plans."

Tidewater Makes Sharp Recovery

A sharp recovery from 1958 was reported by Tidewater Oil Co. in its earnings report for 1959. Net earnings of \$33.9 million were reported last year as compared with \$2.6 million in the previous year.

After dividends of \$1.20 per share on preferred stock, 1959 net earnings on common stock were \$2.23. There was a loss of three cents a share in 1958.

Important factors in Tidewater's 1959 success were record oil and gas production and improved refinery operations.

Budd Unveils Exhibit At Franklin Institute

Edward G. Budd, Jr., president of the Budd Co., has presented a science exhibit to Franklin Institute, Philadelphia. The exhibit stressed Budd's diversified operations in U. S. industry.

Replacing an earlier Budd display, the exhibit covers a wide range of industrial and scientific items ranging from high-speed commuter transportation to precision stress measurement and industrial and medical use of radioisotopes.

Correction Notice

In the March 1, 1960 issue, a news report published in *AUTOMOTIVE INDUSTRIES* used the following statement—"With acquisition of F. Perkins Limited, and Standard Motor Company Limited, Massey-Ferguson is now the world's largest manufacturer of farm tractors."

The statement should have reported that Massey-Ferguson purchased only certain assets of Standard being used in Standard's manufacture of tractors for Massey-Ferguson. All of Standard's (now named "Standard-Triumph") other business, including the manufacture and sale of the Triumph TR-3 sports cars and newly announced Herald, was not involved in any way in the Massey-Ferguson matter.

BRITAIN'S CHEAPEST 'REAL' AUTO



This Ford Popular sells for the equivalent of \$975, although local tax boosts price to \$1380. It is cheap version of 100E Anglia and uses the same 71.49-cu in. L-head engine that develops 36 hp at 4,500 rpm.



PERFECT CIRCLE PISTON RINGS ARE BUILT TO TAKE IT



HOTTER THAN A BLOWTORCH

The searing heat that's created inside engine cylinders causes inferior piston rings to lose their strength and resilience, and wear out far before their time. That's why Perfect Circle employs special metallurgical skills to produce ring materials that have the high heat stability needed for long life.

Extra-thick, solid chrome plating adds greater protection against scuffing. And, special alloys and heat treating deliver extra-high heat resistance for critical applications.

Whatever the job, Perfect Circle rings are built to take it. Insist on Perfect Circles—first choice of leading engine manufacturers and mechanics everywhere.



PERFECT CIRCLE

PISTON RINGS • PRECISION CASTINGS • POWER SERVICE PRODUCTS • SPEEDOSTAT

HAGERSTOWN, INDIANA • DON MILLS, ONTARIO, CANADA



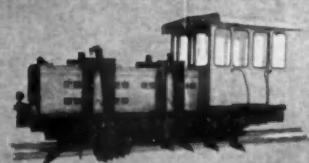
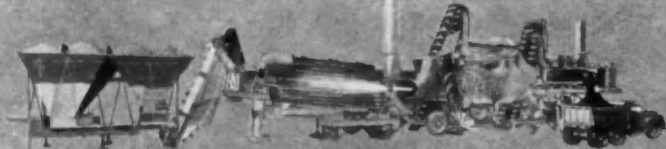
BENDIX BUILDS MORE BRAKES



FOR MORE DIFFERENT VEHICLES



THAN ANY OTHER MANUFACTURER



No matter how special your needs . . .

It pays to put your braking problems up to Bendix!

Braking *means* Bendix to vehicle design engineers. Their confidence in Bendix is evidenced by our current production schedules for more than 400 different automotive brakes. § In four decades of close and continuing association with vehicle manufacturers, Bendix has made many major contributions—four-wheel brakes, Duo-Servo® braking, automatic brake adjusters, power braking . . . to name just a few. Today's high-horsepower engines and expressway speeds call for even greater braking safety and dependability—and Bendix has the answers! § To insure delivery of highest quality braking equipment, we conduct more brake pre-testing than anyone else in the world. Both in scientific laboratory work and exhaustive, over-the-road testing, we thoroughly check out all brake designs before they are OK'd for production. § Bring *your* braking problems to Bendix—largest single manufacturer of braking equipment in the world. Our Customer Application Engineers are ready to work with you at any time. Call on them for information and advice.

BRAKE HEADQUARTERS



OF THE WORLD

Bendix PRODUCTS
DIVISION **South Bend, IND.**



This is the 28-inch blank used in manufacture of large gas cylinders at Norris-Thermador Corporation, Los Angeles, after treatment with Bonderite and Bonderlube. The white, "reacted-on" Bonderlube is a visual check on drawability.

Finish size of cylinder, three operations later, is 8 inches in diameter and 32½ inches long. Only two annealing operations are required from blank to finished size.



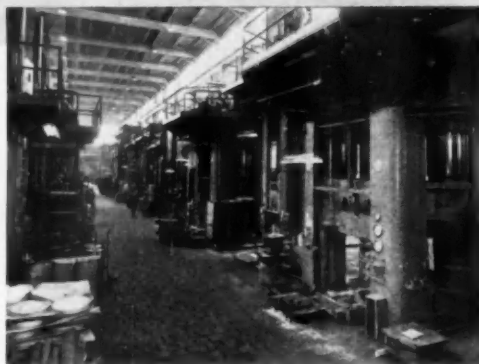
After cupping and first draw, pieces are annealed, pickled, and treated with Bonderite and water-insoluble Bonderlube. No vapor-wash with this uniform lubricant.



Increased production at lower costs, real savings with BONDERITE and BONDERLUBE in cold drawing

In heavy drawing operations like those illustrated, high lubricant film strength is vital. BONDERITE, an integral phosphate coating on metal, and BONDERLUBE, chemically combined with the BONDERITE coating, produce an unexcelled, tough film that continues to act as a separating layer even when the surface area worked is increased several times.

This tough integral film moves along with the metal surface. So, you can get greater reductions, use double pass operations and can produce millions of parts without change in your die setup. Results are expanded press productivity and real cost savings.



The press room at Norris-Thermador, Los Angeles. (Photos courtesy Norris-Thermador Corp.)

A further, major source of savings is the reduction in number of necessary process anneals, substantially decreasing handling, pickling and relubricating costs. Even better, with reactive BONDERLUBE, lubricant costs are frequently reduced to a fourth of the former cost.

AIDS ANY SEVERE IRONING OPERATION

If you draw tubing, wire, bumper bars, frame members, motor mounts or do other severe drawing operations on steel plate, BONDERITE and BONDERLUBE will lower forming costs in your plant. Parker's staff of specialists will be sure you get the right combination to raise production and save you money. Write us today.

Parker Rust Proof Company

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BONDERITE corrosion resistant paint base • BONDERITE and BONDERLUBE aids in cold forming of metals • PARCO COMPOUND rust resistant • PARCO LUBRITE—wear resistant for friction surfaces • TROPICAL—heavy duty maintenance paints since 1883

Since 1914—Leader in the field

*Bonderite, Bonderized, Bonderlube, Parco, Parco Lubrite—Reg. U.S. Pat. Off.



This waterproof tape grabs hard, seals tight and holds fast

From drugs to cables to cars—powerful Polyken tape seals out trouble

Packaging

At pharmaceutical companies, packaging engineers demand both a perfect seal and holding power—high tack, sure adhesion, superior tensile strength. That's why so many use Polyken waterproof tapes. In the picture above, you see how one major pharmaceutical firm rolls on Polyken waterproof tape in one smooth hand operation. This drum contains bulk drugs, which exert as much as 35 pounds weight against the lid during shipment.

Electrical

Another example of the high standards Polyken tapes meet in many, widely varied industries, is Polyken electrical tape. Electrically, Polyken has countless uses in sealing and insulating cables, wires, switches, and controls.

Automotive

A further example is in automotive assembly, where Polyken tapes seal gauge holes and protect parts, such as automotive wiring harnesses.

Ask your Polyken representative about the many Polyken waterproof tapes and their various uses. Polyken men are the most carefully trained tape technicians in the business.



Check with the Polyken Industrial Tape Distributor nearest you. Look in the phone book under "Tapes" or write to Polyken Sales Division, 309 W. Jackson Blvd., Chicago 6, Illinois. (In Canada, write Polyken, Curity Ave., Toronto.)

Polyken®

INDUSTRIAL TAPES

THE KENDALL COMPANY
Polyken Sales Division



**AGAIN . . . Ford Industrial Engines
are selected for outstanding
performance and compactness**



Leading OEM powers GIANT VACUUM CLEANER with FORD INDUSTRIAL ENGINES

PROBLEM: How to keep airports free of dirt and debris that cause tremendous damage when "sucked up" by powerful jet engines.

SOLUTION: Use Consolidated Diesel Electric's Model 2095 Vacuum Sweeper shown above!

Powered by two modern Ford Industrial Engines, the Consolidated Sweeper is designed to clean one million feet of runway per hour . . . picking up such debris as sand, gravel, wire, nuts and bolts. Just as Ford power contributes to the effectiveness of this unit, it can bring a new kind of efficiency to your equipment. Here's why:

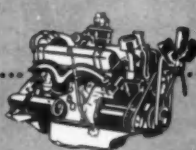
Ford's full line of Short Stroke engines are compact, durable and economical to operate. Ford's space-saving construction and *high power-to-weight ratio* also give you a distinct manufacturing advantage: greater freedom of design.

Ford engines range from 134 to 534 cubic inches—including two highly efficient diesels. All are available as

complete engine assemblies or power units. And, remember, because Ford engines can be serviced by any local Ford Dealer, your customers can get quick on-the-job service when they need it.

These are but a few of the important reasons why equipment designers, sales managers and top management are specifying Ford Industrial Engines. It will pay you to swing to Ford power if you haven't done so already.

More power to you...



Ford

**INDUSTRIAL ENGINES
AND POWER UNITS**

**FORD POWER IS RIGHT FOR
YOUR EQUIPMENT, TOO!**

INDUSTRIAL ENGINE DEPARTMENT, FORD DIVISION, FORD MOTOR CO., P.O. BOX 598, DEARBORN, MICH.

West of Rockies write to:

→ FORD INDUSTRIAL ENGINE DEPT., P.O. BOX 6787, LOS ANGELES 22, CALIF.

→ FORD INDUSTRIAL ENGINE DEPT., P.O. BOX 1666, RICHMOND, CALIF.

NEWS

FEATURES

2,002,240 Models in First Quarter Make It Second Best in Auto History

The automobile industry built 2,002,240 cars during the first three months of 1960 for the second-best opening quarter in history. Only 1955 got off to a better start, and '55 still remains the year with the record total output.

The three-month total topped last year's first-quarter output of 1,600,357 passenger cars by nearly 26 per cent, but it still fell short of earlier forecasts of 2,250,000 cars. Output dropped in March for the second straight month, and March's total of 654,252 cars was barely 12 per cent ahead of last March.

Blame Bad Weather

Bad weather in much of the country received part of the blame for the March production cuts. Haulway trucks were unable to remove new cars from factory lots in some cases, and parts shipments were hampered by the extreme weather.

But most of the cutbacks were intentional, planned to "adjust new car inventories to sales," as the saying goes. In other words, field stocks of new vehicles were too high. In fact, inventories are at one of the highest levels in history.

This means that further "adjustments" — short work-weeks and scattered plant closings—may be necessary during the next two months. It also means an early end of model production might be necessary for some lines, with the first

lines phasing out in perhaps eight weeks.

But more important than the production total is the breakdown by individual makes—all the more interesting this year because of the new compacts. Rambler, Falcon, Corvair, Valiant, Lark and Comet (in that order) accounted for 23.8 per cent of all U. S. passenger car production during the first quarter. And in March, compacts upped their share to more than 26 per cent with 171,259 units.

Comet was partly responsible for the compact surge in March. This new Ford compact got into produc-

tion in late February and then turned out 15,293 cars in March.

And Rambler was partly responsible for the increase. Rambler built 48,687 cars in March to top its own monthly record of 43,136 cars, set in February. This gave Rambler a three-month total of 132,659 cars, also a record.

The round-the-clock Rambler production put the compact pioneer in first place among the small cars and in third place, behind Chevrolet and Ford, in over-all standings for both the month and the period. Falcon, with production of 126,133 so far this year, wound up in fifth place behind Pontiac.

Studebaker-Packard's Lark fell from 50,076 for the year-ago period to only 34,635. Studebaker has
(Turn to page 48, please)

ENGLISH STATION WAGON RESTYLED



The Rootes Group's Hillman Husky station wagon features new frontal treatment, more glass area and a ribbed roof panel for greater rigidity and noise reduction. It is powered by a 51 hp 85 cu in. engine.

A I TABLOID A I

U. S. consumption of new rubber amounted to 139,125 long tons in February, 1960, compared to 141,398 tons in January, 1960, and 134,738 tons in February, 1959.

Two Navy manuals on snow removal and refuse disposal, offering practical advice for businesses and industrial plants, are now on sale to the public through the Office of Technical Services, Business and Defense Services Administration, U. S. Department of Commerce.

The increasing number of compact cars is expected to boost the use of regular grade gasoline to 70 per cent of the market by 1964. Last year, regular grade gasoline accounted for 57 per cent of consumption.

The foreign market for precision measuring instruments manufactured in the U. S. chalked up another record last year when sales amounted to \$279 million in 130 countries. The exports represented one-twelfth of total U. S. production and compared with \$272 million in 1958.

Development of a design for a one-watt resistor capable of operating at extreme temperatures in nuclear radiation environments is described in a research report for the Air Force just released to industry by the U. S. Department of Commerce.

Recent tests of additives to prevent carburetor icing show that surface-active de-icers still offer advantages over freezing-point-depressive de-icers, according to the Southwest Research Institute.

Gas turbines designed for marine and industrial uses are scheduled by General Electric for production in sizes ranging from 50 to 20,000 shaft hp. A 20,000-hp model reportedly will serve as the main power plant in the 80-ton hydrofoil boat Grumman Aircraft is building for the Maritime Commission.

The behavior of materials to be used in hypersonic flight, the effect of gas motion on rocket chamber combustion, and the physical properties of a number of liquefied gases and solids at extreme low temperatures are the subjects of three Air Force technical reports released for sale by the U. S. Department of Commerce.

The highway departments of 48 states expect that by 1976 there will be 114 million registered motor vehicles that will be driven 1.2 trillion miles that year. In addition, they are expected to consume 97 billions gals. of fuel. The estimates, prepared for Congress, include 154 million persons of driving age (15 to 74). This would mean three vehicles for every four persons of driving age.

While Delaware is next to last in area, it ranks No. 1 in the Nation for receiving patents for inventions, according to the Patent Office. A total of 46,937 patents was issued during 1959 to U. S. residents—one to every 3,808 persons as compared with 43,429 patents—one to every 4,019 persons in 1958. In Delaware, one patent was issued to every 1,205 persons.

Results of five years of study of the short-time tensile properties of structural metals are reported in an Air Force publication recently released for sale to the public. Two other reports, one on stress distribution in a plate with a hole subjected to axial load and creep, and the second on creep deformation in a single riveted joint, also are available.

All-time peaks for aluminum production and distribution in the U. S. were established last year. Domestic primary production was 3.9 billion lbs., 25 per cent above 1958 and 16 per cent higher than the 1956 peak. This brought the new supply of crude aluminum from all sources to 5.3 billion lbs., 22 per cent above 1958 and 13 per cent above the peak year of 1956.

(Continued from page 47)

been "adjusting" with a four-day work-week, but a 13-day strike in March helped slash production that month by more than half, down to 8723 units.

Studebaker is not the only maker to suffer a sharp cut in production this year. One of the big surprises is the standard Ford, which dropped by nearly 70,000 units.

While over-all Ford Div. sales are up in 1960, due to the popularity of Falcon, the division is feeling the compact pinch. A year ago Ford production for the quarter totaled 398,722 cars, including 18,461 Thunderbirds. This year the output dropped to 332,855 units, including 22,731 T-Birds.

Chevrolet Gains

Chevrolet is not experiencing this same larceny by its compact. Standard Chevrolet production is up from 441,937 for the 1959 quarter to 500,559 this year. Corvair production of 93,880 is in addition to this.

Plymouth production is running slightly behind last year—down from 95,683 to 89,643 in the first period. Plymouth, however, is operating with about half the number of dealers it had in 1959. The curtailed operation has dropped Plymouth into ninth place in industry standing so far this year, just behind Corvair and ahead of Buick.

Valiant, a slow starter because of the steel strike, is climbing fast. Valiant built 42,000 cars in January and February, but added another 29,493 in March to climb to eighth place for that month. In fact, Valiant topped Corvair in March.

Pew Elected

George T. Pew, president, Aero Design & Engineering Co., Bethany, Okla., has been elected chairman of the Aerospace Industries Association's Utility Airplane Council.



Claude A. Williams has been appointed general chairman of 1960 National Conference of American Production and Inventory Control Society to be held in Detroit.

\$12 Million Trucks Awarded to Ford

Ford Motor Co. obtained nearly \$12 million in Defense Dept. truck contracts during March.

The first contract, for \$2.4 million, was for 1065 special ¼ ton pickup trucks with a four-door, six passenger cab for the Air Force and Navy.

Another contract for \$4.6 million for 3482 pickup trucks for the Air Force, Army and Navy was awarded a week ago and a few days later Ford was awarded a \$4.9 million contract for 2344 stake and dump trucks of the F-500 and F-600 series.

Press Officer Named

The British Automobile Manufacturers Association has appointed Paul Lehman press officer for the United States.

Anti-Freeze Tests Give Assurance Of Protection for Aluminum Engines

Despite the claims of leading automotive engineers, there is at least one anti-freeze that will give adequate protection to the aluminum engines scheduled to appear in some 1961 automobiles.

Union Carbide Corp. engineers, at their Tonawanda, N. Y., research laboratory, have revealed to automotive editors and writers a well-documented story of their Prestone's compatibility with aluminum.

Since 1932 thousands of tests have been made at Tonawanda to determine the effect of anti-freeze on aluminum. Union Carbide chemists and engineers point out that few, if any, of the other anti-freeze makers were in business back in the '30s when they might have tested a number of American autos which were then made with aluminum components.

Today, tests at the Prestone laboratory cover three stages. The first, the glassware test, is the simplest and most convenient method of testing an anti-freeze's performances. This test involves placing metal specimens, including aluminum, in a glass filled with

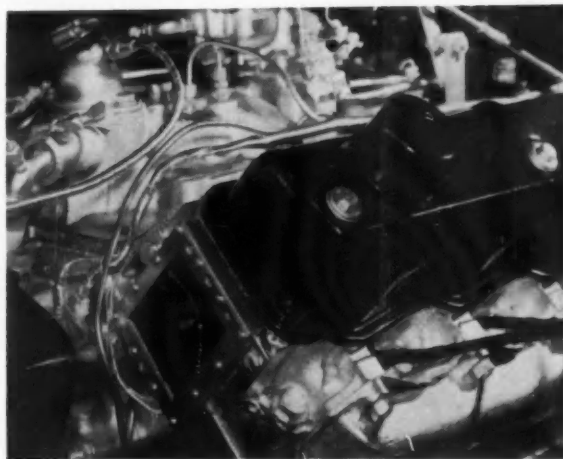
the test anti-freeze. If the aluminum turns up pocked and scarred, the anti-freeze being tested flunks out and is tortured no further.

The second test involves an engine operating on a dynamometer where the coolant circulates, much the same as it would in normal road service. The anti-freeze's effect on aluminum is measured by metal specimens placed in the cooling system. Failure at this stage again eliminates the anti-freeze from further tests.

In the third test the anti-freeze is placed in the cooling systems of many vehicles with aluminum parts and is tested throughout the country under different driving conditions. Prestone has passed all these tests, chemists say, and is ready for aluminum engines when they appear.

Most anti-freezes fail, chemists declare, because their inhibitors, the additives that prevent rust and corrosion, are designed primarily for iron and do not protect aluminum adequately. Prestone, they add, has a balanced inhibitor system which proved congenial with both iron and aluminum and was compatible in all three test stages.

Behavior of anti-freeze in contact with hot metal of cylinder head can be studied through window in dynamometer engine.



'Brain' Pilots Plane Non-Stop Across U. S.

The world's "brainiest" plane, an Air Force F-106 Delta Dart, has flown itself from California to Florida. The 2500-mi. flight was the longest ever made by an interceptor aircraft without refueling.

Maj. Frank Forsyth, Air Materiel Command chief acceptance pilot for the F-106, took off from Palmdale, Calif. Minutes later the plane picked up an electronic signal from the ground and Maj. Forsyth took his hands from the controls. The F-106 then flew itself to Jacksonville, Fla. The pilot took over control, turned, and flew back to Tyndall Air Force Base, Fla.

Key to the fully automatic flight was the plane's MA-1 navigation and fire control system, built by the Hughes Aircraft Co. This system is designed to fly the interceptor through all phases of a mission from shortly after takeoff to landing.

Before the F-106 took off engineers pre-programmed its entire flight profile into the MA-1 system. This included such data as route, altitude and fuel available. With this information and continuous range and bearing information flashed to the speedy aircraft by TACAN (tactical air navigation) stations across the U. S., the Hughes system automatically compared the jet's position to the prescribed route and supplied signals to the airborne flight control system.

Signals from each new TACAN station automatically projected a new 400-mi. diameter map on Maj. Forsyth's tactical situation display screen. The signals tuned the interceptor's radio receiver to the proper wave length and informed the computer which map was being displayed.

Truck Production 16 Pct. Above '59

Truck production is running about 16 per cent ahead of last year, with further gains expected during the second quarter of 1960.

Output through April 2 totaled 385,627 trucks and commercial vehicles, compared with 323,845 a

year ago. Chevrolet, with 137,945 units, held a comfortable lead over second-place Ford, with 105,596. Chevrolet, in fact, has increased its output over 1959 by 32,000 trucks, while Ford is running 19,000 ahead of last year.

International, Willys, GMC and Dodge-Fargo followed in that order for the first part of the year. All except Dodge showed increases. Dodge was only 235 units below last year.

Others makers to boost 1960 production were Divco, FWD Corp., and White. The other major producers registered slight decreases in output.

20 Pct. More Plan To Purchase Autos

Consumer plans to buy new automobiles are running 20 per cent above a year ago, but only slightly ahead of June and November last year, according to the latest report

from the University of Michigan Survey Research Center.

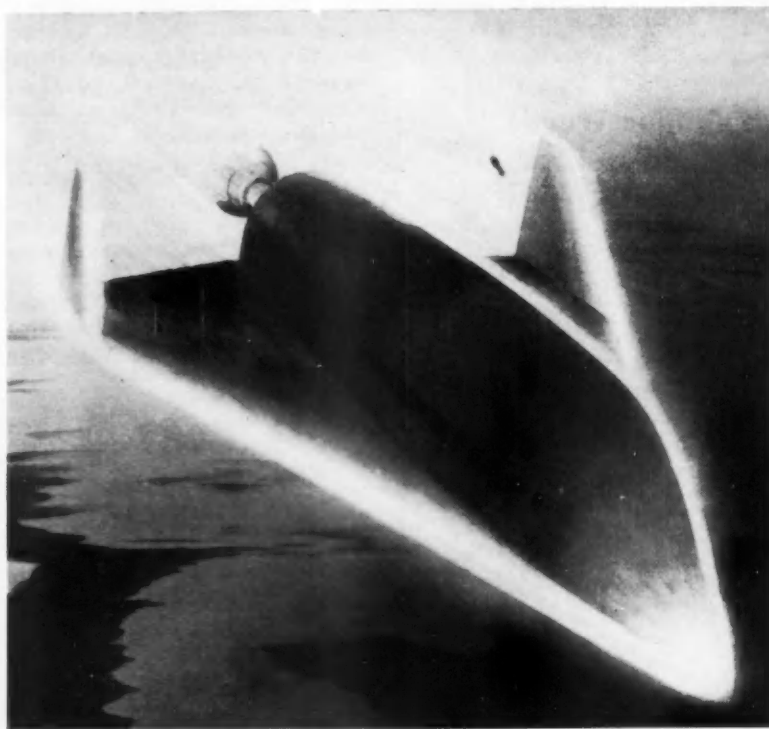
"Consumer attitudes toward compact cars remain very favorable," the Center reports, and since a "substantial proportion of prospective buyers" intend to purchase compact cars, the median planned expenditure for new cars shows a sizable drop compared to a year ago.

Westland and Fairey Merge in Britain

Merger of two large British helicopter companies, Westland Aircraft, Ltd., and Fairey Aviation, has been announced.

Westland acquired Sanders Roe and Bristol Aircraft Corp. helicopter divisions last year. The latest merger means all major helicopter manufacture in Britain will be directed by one board of directors.

HYPERSONIC TRANSPORT OF 1980?



Leading edges of its wings glow red hot as futuristic transport re-enters the atmosphere at 15,000 mph on 6,000-mi. flight. Although re-entry subjects the transport to temperatures up to 2500F, it will be constructed to safely withstand such heat. Flight will take an hour predicts Leston Faneuf, board chairman, Bell Aircraft Corp., in address on peacetime uses of space.

Rocket Engine Costs Slashed by 37 Pct.

Production costs of rocket engines for Thor and Atlas ballistic missile engines have been cut \$27 million, for a 37 per cent reduction since 1957.

The huge slash represents the difference between \$45 million, actual cost of 1959 engines for Thor and Atlas, and \$72 million, the amount the same quantity of engines would have cost at their 1957 production costs.

Rocketdyne, a division of North American Aviation, Inc., builds propulsion systems for Thor and Atlas and produces engines for Redstone, Jupiter and Saturn. Division officials said the savings were aided by normal manufacturing learning curves, design improvements, budgetary and production controls and innovations and special suggestion awards.

Navy Tests 'Copters As Minesweepers

Helicopter minesweepers have been undergoing tests by the Navy at Panama City, Fla.

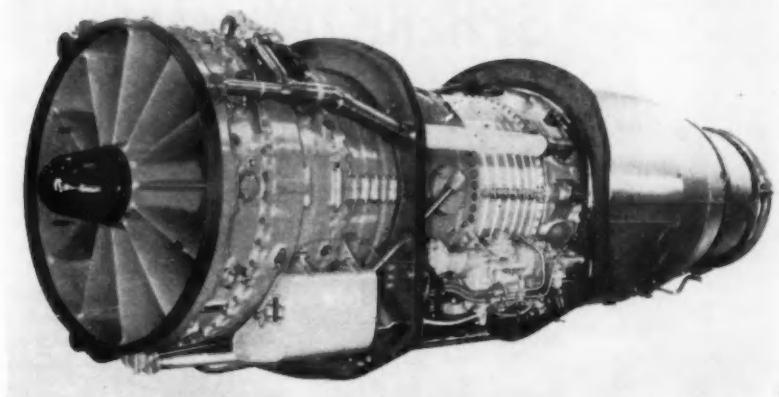
Officials stress the great gain in safety the helicopter brings to mine counter-measures since the machine and its occupants are not vulnerable to mines.

Additional tests are planned before the Navy makes a final decision on the use of helicopter minesweepers.

Contamination Control Of Rocket Engines

A handbook on contamination control for liquid propellant rocket engines has been prepared by a team of specialists from industry and government representing the Guided Missile Council and Pro-

MOST POWERFUL MILITARY JET ENGINE



The Bristol Siddeley Olympus 21, called world's most powerful military jet engine, is uprated to 20,000 lb. thrust without reheat. Developed from the twin-spool compressor Olympus 201 now in production, it includes an extra stage on front of the low-pressure compressor and a shorter air intake.

pulsion Technical Committee of the Aerospace Industries Association.

This is the first publication covering standard levels of cleanliness, methods of inspection, and cleaning procedures for liquid rocket engines. The handbook provides an authoritative single source of information covering all facets of contamination control.

Chrysler, AMC Aides Named to AMA Posts

Officials of two automobile companies have been elected to committee posts in the Automobile Manufacturers Association.

Paul G. Fritzsching, Jr., director of Corporate Traffic Office, Chrysler Corp., was elected to a one-year term as chairman of the AMA Traffic Committee.

Carl J. Barbee, attorney for the Automotive Div., American Motors Corp., has been elected chairman of the Patent Committee.

First Air Car Is Tested by Army

The Army is testing the first of two air cars delivered at Ft. Eustis, Va. Designed for travel over land or water, the air car moves on a six to 12-in. cushion of air blown into the area between the base of the car and the surface over which it is moving.

The air car at Ft. Eustis is one of two purchased by the Army from the Curtiss-Wright Corp., Wood-Ridge, N. J. The second car is expected to be delivered soon.

South African 'Jeep'

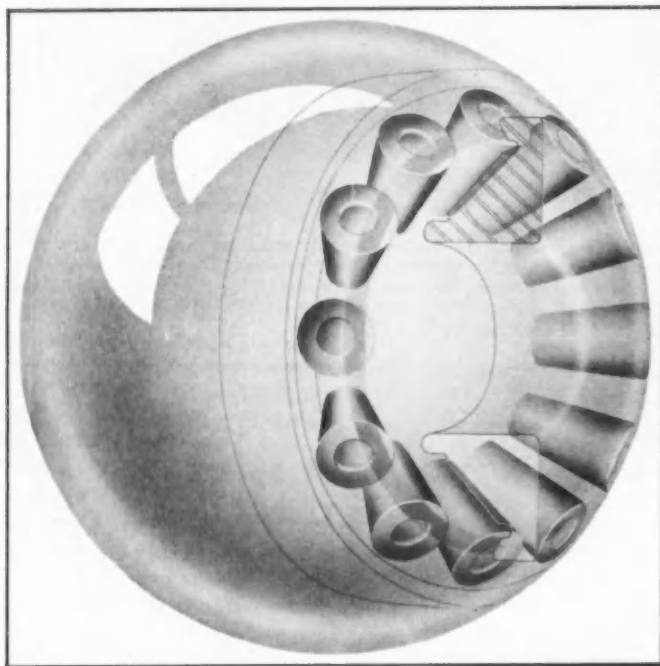
An agreement has been signed between Willys Overseas, S. A., Zug, Switzerland, and Willys Africa (Pty) Ltd., Johannesburg, for assembly and distribution of "Jeep" vehicles in the Union of South Africa. The first "Jeeps" are expected to come off the assembly line within a month.



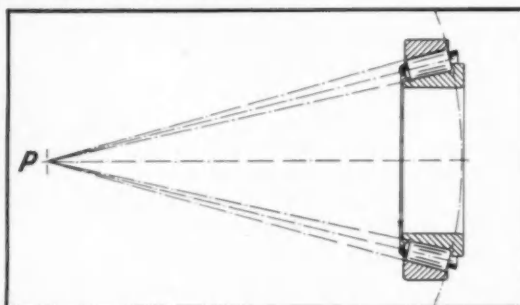
One in a series of technical reports by Bower

BEARING BRIEFINGS

SPHERICITY — ESSENTIAL TO MAXIMUM BEARING PERFORMANCE



When you require bearings, we suggest you consider the advantages of Bower bearings. Where product design calls for tapered or cylindrical roller bearings or journal roller assemblies, Bower can provide them in a full range of types and sizes. Bower engineers are always available, should you desire assistance or advice on bearing applications.



True rolling of tapered bearing elements depends upon maintaining a true spherical radius during manufacture.

For a tapered roller bearing to achieve maximum performance, i.e., maximum life and capacity under load, it must have true sphericity — a condition of bearing geometry which permits true rolling of the tapered rollers in the raceway.

True rolling in tapered bearing elements is the result of maintaining a critical geometric relationship between the raceways and the contact surfaces of each roller. True rolling is essential to maximum performance. Without it, premature bearing failure is certain.

As engineers know, a tapered roller will describe a true circle when rolled on a plane surface. It will always roll in this one path precisely, without sliding or skewing. But to put true rolling to work in a bearing which can carry both heavy thrust and radial loads, it is essential that the rollers and the raceway have a true

spherical radius, or sphericity. The drawing illustrates this condition.

If each roller in the bearing were to be extended in length, while retaining its taper, it would form a cone, terminating at point "P". All cones generated from all rollers would meet at point "P", which is also the center of the hypothetical sphere shown. The surface of the sphere would touch all points on each roller's head!

In effect, then, each roller's taper determines the radius of a hypothetical sphere

whose surface, in turn, determines the correct contour for each roller head. Only when these conditions are satisfied in design, and when they are rigidly held during manufacture, will true rolling take place. In the manufacture of each Bower tapered roller bearing, sphericity is held within extremely narrow limits by means of special Bower-designed precision grinders. The consistent accuracy possible with these machines is one major reason why Bower roller bearings provide maximum performance under all speeds and loads up to the bearing's maximum rating.

BOWER ROLLER BEARINGS

BOWER ROLLER BEARING DIVISION — FEDERAL-MOGUL-BOWER BEARINGS, INC., DETROIT 14, MICHIGAN

MI E IN

IN THE NEWS



Illinois Tool Works Products Div.—Andrew L. Pontius has been named vice president in charge of operations.



Norma - Hoffman Bearings Corp. — G. Bruce Wilson has been named assistant eastern regional sales manager.



Gleason Reel Corp., Tormag Products Div.—C. L. Richards has been appointed manager.



American Motors Corp., Economic Analysis Dept.—William W. Hotchkiss has been named manager.



Joseph T. Ryerson & Son, Inc.—Wallace E. Felldin has been named sales manager of the New York plant.



Judson L. Thomson Mfg. Co.—**Kenneth E. Joy** has been named to the new position of vice president in charge of sales.

National Lead Co.—**Carleton Smith** has been elected president, Canada Metal Co., Ltd., a subsidiary.

Tidewater Oil Co.—**Roy B. Alcott** has been named employee relations manager for Eastern Div.

Thompson Ramo Wooldridge, Inc.—**Richard F. Kindervater** has been appointed associate director of purchases.

Aerojet-General Corp.—**Gen. O. P. Weyland, USAF, (ret.)**, has been named a consultant and a member of the Corporate Advisory Board.

Temco Aircraft Corp., Temco Electronics Div.—**Dr. Charles K. Hager** has been named section manager of automatic controls.

Highway Trailer Co.—**George J. Hauser** has been appointed assistant to the president for sales.

Dayton Rubber Co.—**L. J. Keyes** has been named vice president and director of purchases.

Borg-Warner Corp.—**J. M. L. Joslin** has been appointed manager of executive development and training.

Enjay Co., Inc.—**Clifford A. Coffey** has been named manager of the new Automotive Development Group.

Chrysler Corp.—**Robert B. McCurry, Jr.**, has been appointed director of dealer enterprise.

American Motors Corp., Kenosha Div.—**Clement A. Jorgenson** has been named manufacturing engineer.

General Motors Acceptance Corp.—**Deryl Hull** has been promoted to assistant manager of United States branch operations.

Bendix Aviation Corp., Sheffield Corp. Div.—**Louis Polk, Jr.** has been appointed manager of operations.

United States Rubber Co.—**Dr. Charles F. Eckert** has been named manager of elastomer research.

Eaton Mfg. Co., Valve Div.—**Carlton H. Swanson** has been named factory manager.

Skinner Chuck Co.—**Bruce A. White (left)** has been appointed New England field representative. **Firestone Tire & Rubber Co., Racing Div.—William Yarnall, Jr.**, has been named Pacific Coast general sales and service manager.

Dana Corp.—**R. E. Fletcher** has been named chief engineer of the mechanical Transmission Div. and **John A. Kayser** has been named chief engineer of the Universal Joint Div.

E. I. du Pont de Nemours Co.—**Paul H. Richard** has been named head of a new automotive division.

General Motors Corp., Motors Holding Div.—**Henry H. Hauser** has been named manager of branch operations.

Lindberg Steel Treating Co.—**George H. Bodeen** has been appointed general sales manager and **Stanley Skozek** was elected assistant secretary.

General Motors Corp., AC Spark Plug Div.—**Alvin B. Goodspeed** has been promoted to director of contracts.

Napco Industries, Inc.—**Louis M. Vlancsin** has been named plant manager.

United States Rubber Co.—**Daniel Shichman** has been named manager of fiber engineering research.

American Radiator & Standard Sanitary Corp., Industrial Div.—**Charles H. Harper** has been named director of industrial relations.

General Motors Corp.—**Donald E. Werner** has been appointed assistant director of unemployment and workmen's compensation.

Goodyear Aircraft Corp.—**Loren A. Murphy** has been appointed vice president in charge of manufacturing.

Firestone Industrial Products Co.—**J. E. Gieck** has been named Airide sales manager.

Seiberling Rubber Co.—**Donald R. Kronenberger** has been appointed comptroller.

Necrology

Lawrence W. Fischer, 64, automotive executive sales engineer for the Bendix Products Div., Bendix Aviation Corp., died while on a business trip to Port Washington, Wis. He was formerly employed by Continental Motors and Timken-Detroit Axle Co.

Chesley A. Paul, 67, retired vice president in charge of purchasing and a director of the Mathews Conveyor Co., died March 5 in Ellwood City, Pa.



FASTENER BRIEFS

RUSSELL, BURDSALL & WARD BOLT AND NUT COMPANY



Technical-ities

By Fred E. Graves

Fastening of gasketed joints

The right fastener for a "flexible" joint rests on type of gasket material and its compressibility. Total preload on all the fasteners in the connection must be enough only to compress the gasket and provide sufficient additional clamping force to withstand the hydrostatic test pressure. More than this brings on a good chance of leakage, through "bowing" of the clamping plate.



Exaggerated sketch showing how too much torque tends to distort clamping plate and leads to leakage.

HYPOTHETICAL CASE

Suppose a joint is tightened with Grade 5 Hex Screws to their yield strength, and leakage develops. By going to alloy screws and tightening still further you would still get leakage. But Grade 2 Hex Screws, all torqued evenly, would no doubt solve it.

ACTUAL CASE

The fasteners on one product's flange had to withstand a 4000 pound hydrostatic pressure. But the hard asbestos gasket used took a bolt load of 28,000 pounds for sufficient compression to seal. By substituting a rubber and fibre gasket in this case, bolt load could be reduced. So could bolt size, thereby saving 73% on fasteners.

Using Hex Screws in tapped holes saves money



In the cast "coupon" shown above, the hex screws were torqued tight and removed 50 times—then torqued to failure. Note in the cutaway that the casting's threads are still perfect with no sign of stripping. It was the screws which broke—a clear demonstration that castings fastened with hex screws will suffer no thread damage during repeated disassemblies.

TWOFOLD BENEFIT

When there are no space clearance problems or other special requirements, using studs of 1-inch diameter or smaller often penalizes the user. First, in direct costs, since the more economical hex head screws will do the job to specification. And second, in production costs, since studs require that tapped holes have an *interference* thread fit, which in turn results in slow, "selective" assembly to determine properly

mated threads. Hex screws need only a *clearance* fit, assemble faster.

ACTUAL EXAMPLE

In one of his surveys of fastenings used by one company, the RB&W engineer pointed out that over 250 stud fastenings were being used in a large refrigeration unit. The same number of hex screws, costing \$8.45, saved \$22 over the studs and nuts. Annually, the total would be \$7,800 on the production run of this unit.

Not to be overlooked either was the tangible saving on the less critical tapping job required.

RB&W offers its help on your specific fastener problems, or an overall survey of your fastener usage. Contact Russell, Burdsall & Ward Bolt and Nut Company, Port Chester, N. Y.

Plants at: Port Chester, N. Y.; Coraopolis, Pa.; Rock Falls, Ill.; Los Angeles, Calif. Additional sales offices at: Ardmore (Phila.), Pa.; Pittsburgh; Detroit; Chicago; Dallas; San Francisco.

Box Score for the First Quarter



an Editorial

AT THE OPENING OF THE YEAR, pocketbooks of all families affected by the Steel Strike were pretty thin. Many had been financed for food and rent and had gone into debt. This removed a pretty large segment of the total "buying" public from the usual normal national market for 1960 automobiles. About the middle of January, the American "middle class"—managers, professional people, self-employed, and small business proprietors—realized when they made out their January 15 tax returns that they would have less surplus cash than they had expected because of the larger total of federal, state and local taxes which they either had to pay or anticipate paying before the deadline. Auto dealers everywhere reported that sales were very adversely affected by these conditions.

THROUGH FEBRUARY, UNUSUAL WEATHER CONDITIONS made it even more difficult for buyers and sellers to get together on auto deals because, as a national magazine pointed out, "Nobody has been found yet who would shovel a snow path all the way from his house to his car dealer." There was also the unusually tight condition which existed in credit markets, through the first quarter, as a result of which merchants, contractors and small business people found it difficult to get commercial borrowings for less than 8 per cent and therefore quite naturally restricted cash and did not buy new cars and trucks. It was not until April 4 that leading financial analysts detected an easing of credit reins and pointed out that "Federal restrictions went too far in the second half of 1959, hampering the boom."

NOW THESE WERE THE CONDITIONS that prevailed during the first quarter of 1960, when record production levels were set by the Chevrolet Division of G.M., the Ford Division of Ford Motor Co., the Dodge-Dart Division of Chrysler and by American Motors. The rate of production of cars and trucks combined for the first quarter was on the yearly basis of more than 9,200,000. Combined total car and truck output was more than 466,600 above '59, despite the fact that pipelines were not promptly filled

with iron and steel products at all auto and truck plants, and many assembly plants were closed for short periods because of parts and materials scarcities. As recently as last week, big national banks said they were still short of funds to lend or invest. Meanwhile, cash income at state and federal levels has zoomed up beyond any expected proportions at state and federal financial offices.

AT THE OPENING OF THE SECOND QUARTER, although dealers' stocks of cars are at high levels, in many locations in the South and West dealers cannot get enough cars. In locations in the Northern and Eastern States, some individual dealers cannot keep deliveries abreast of orders. At other locations, new car sales have not yet moved up. Government procurement of military vehicles continues to maintain a "military vehicle gap" which is just as much of a national defense problem as the widely publicized "missile gap." Bankers have reported that the "growth of money supply has ground to a halt."

IT IS ABOUT TIME TO POINT OUT to national and state legislators that excess cash income to federal and state governments curtails consumer buying power uneconomically. Idle federal, state or municipal reserves mean non-productive capital and dangerously non-productive consumer buying capabilities. Managed "freezing of money supply" as a Federal Reserve policy can wreck consumer and industrial buying, employment, marketing and trade. The automobile industry is doing its part to assure high production, high employment, and high consumption. Now it is time for federal and state governments to do their part and correct the grossly excessive regulation and taxation programs which are holding back consumers from fulfilling their normal expectations of normal living. Consumers want more than 22 per cent more cars than they bought last year and cars are being manufactured to meet this predictable demand.

Hooten W. Barclay

Editor and Publisher



"For extra deep drawing we like Sharon Quality Stainless Steels"

— WALTER MARKOWSKI, Pressroom Foreman
S. W. FARBER, Inc.

"Here at Farber we really put stainless steel through severe tests," says Walter Markowski, pressroom foreman. Our product design calls for extra deep draws, delicate rolled edging and bright flawless finishes. Over the years we have found a most dependable source of prime stainless steels in the Sharon Steel Corporation, Sharon, Pa."



SHARON *Quality* **STEEL**

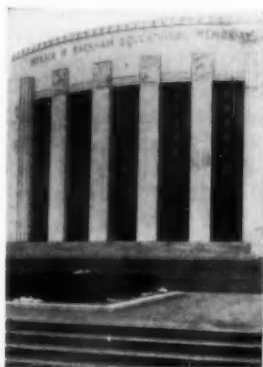
Owen Keeler
President 1959-60
Automotive Division
American Society
for Quality Control



Automotive Quality Control

MEN AT WORK

TO achieve a consistently high degree of quality, a business or industry must first "think" quality. This statement was made by Carl J. Demrick, Vice-President in charge of manufacturing, Plymouth Division, Chrysler Corp., at the First National Conference of the Automotive Division of the American Society for Quality Control in 1958. This concept has been among the primary purposes of the Automotive Division ever since. By organizing and developing a 389-member division in which automotive aspects of quality control could be discussed on a specialized basis, the ASQC has greatly aided the ability of automotive quality control engineers to advance their professional aims. With the emphasis of management in the entire automotive industry on the improvement of both quality control and "reliability" systems in 1960, the work of this division has been moved ahead significantly.



Conference Headquarters
for the Detroit Sessions

The official family of the automotive division this year includes Owen F. Keeler of Chrysler Corp. as Chairman. Chairman-elect for 1960-'61 is John J. Ryan of General Motors. Other 1959-'60 officers include Louis Haydu of Ford Motor Co., Secretary, and J. C. Brown of AC Spark Plug Division of General Motors as Treasurer; Donald M. Spath of General Products Corp. is Past Chairman and Allin P. Deacon, Consultant, is Trustee. The division completed its Third National Conference last February in Detroit, where individual sessions attracted as many as 130 specialists in group audiences.



Executive Committee members of the Automotive Division include (left to right): Joseph Molnar, Morris M. Lightstone, Stanley B. Sherwood, Wm. P. Youngclaus, Owen Keeler (presiding), Louis Hayden, J. G. Jarvis, J. Cecil Brown, and John J. Ryan



Wm. P. Youngclaus, Jr., administrative secretary of ASQC, is the key operating executive of the Society

The activities of quality control engineers have broadened out substantially since the early days when their function consisted of preparing the statistical charts concerning quality fulfillment of engineering specifications. In

checking this expansion of operating relationships, comments of typical conference members at the Detroit 1960 Automotive Conference revealed the following facts. Quality control reports are now used in all major automotive in-

dustry departments such as Purchasing, Production, Top Management, Engineering, Education, and Research and Development. They are also used functionally by vendors and suppliers as well as by the automotive manufacturing departments and divisions. A Quality Control Manager through his staff may be responsible for reports which aid in improving more than 2000 types of individual products. His work may be directly responsible for aiding in cost reduction in operations which range from purchasing, through production and assembly to final customer services. His functions directly affect human relations as well as product quality in many plants.

At the Detroit Conference, Prof. George S. Odiorne of the University of Michigan stressed the following facts which he had observed in studying the growth of quality control systems in the automobile industry. He said that one fact which dominates all others in this industry is the decentralized nature of the big firms. Under this system, division General Managers are urged to decentralize decision-making "down to the lowest possible level." Automobile companies seemed to have executed decen-



**Chester Copin signs up
as a new member**



**Owen Keeler presents
the membership badge**



**The president congratulates
the new member**

INDUCTING A NEW MEMBER AT THE 1960 DETROIT MEETING

tralization sooner and more completely than most other industries, he said, and have provided the model for many other industries.

Line Manager Supreme

As a result, he continued, this form of organization affects quality control directly. It makes the line manager supreme in decision making. It places extreme emphasis on overall performance and profit as well as growth. It gives each unit discretion to choose its own method of controlling quality control.

A second major fact, Prof. Odiorne pointed out, "is the intense and sometimes fanatic attention

to profit." This is a law of survival for the decentralized company and "decisions made on any other basis could result only in the ruination of the industry." There is no automobile company which is so large and powerful that it couldn't "be as dead as a Dodo in 10 years—and in some cases less than that—if it took its eye off this fundamental objective for a moment."

"This attention to profit, costs, production standards and quality are not merely necessary evils," he continued. "They are the single standard of performance which comprises a common language understood in every nook

and cranny of every plant and office."

Capability Analysis

In the work of Quality Control Departments, innovations in recent years have added new varieties of studies to the conventional statistical studies of early years. Quality "capability analysis," for example, is a typical development discussed at a recent annual conference by Harmon S. Bayer of Harmon S. Bayer & Associates, Detroit. Such studies, in brief, explore the capability of improvement of tools and production equipment and processes, as a basis for improvement of overall

SOME Automotive "Punch-Lines"

"Good enough— isn't Good Enough"—B. I. Raysor, Works Manager,
Harrison Radiator Div., General Motors Corp., Lockport, N.Y.

"Understanding of People—can be achieved"—E. V. Grumman, Chief Engr.,
The Bullard Co., Bridgeport, Conn.

"Quality is not determined by price"—Emlyn Lloyd, Dir. of Pur. Admin.,
Chrysler Corp., Highland Park, Mich.

"Understanding and enthusiasm are not enough"—George Gillogly, Stat. Anal.,
Canton Forge Div., Ford Motor Co., Canton, O.



**Automotive Division
finance committee in-
cludes (left to right):
J. Cecil Brown, John J.
Ryan, and J. G. Jarvis**

product quality performance in the manufactured product. The need for expansion of such studies is almost unlimited, he said.

Other new areas of analysis include the study of operator influence on portable tool performance. Methods of handling the tools may mean the difference between good and bad quality. In another example, the quality control group may investigate the relationship of natural tolerances to various operations, such as the specifications for drilling specified holes for matching components. In some cases, the designer is not aware of the stresses which occur in assembly with the result that frequently matching holes do not line up. Very frequently the design tolerances of individual parts or even of whole assemblies are totally unrealistic.

Problems in Taking Data

The unique high production nature of the automotive production processes poses other problems for quality control specialists which are not normally encountered on an equal scale in other industries. The speed of the production or assembly line is the dominant factor in the cost system. Therefore quality control engineers must learn to take their data without interfering with production. Techniques of obtaining data are sometimes more time consuming and take more careful planning than working out the problem once the data are ob-

tained, it was learned.

The work of quality control engineers often directly improves specific components. Typical examples of successful case histories, about which full information was exchanged within the Automotive Division of ASQC, include the control of excessive variation of finish paint, redesign of connecting rods, refinement of an automatic transmission main shaft, improvement of finished manufacture of front fenders and improved specifications for automobile frames.

Annual Model Change

Prof. Odiorne of the University of Michigan, at the 1960 sessions of the Automotive Division, emphasized another important aspect of American quality control operations. He said that Europeans are amazed when they come face to face for the first time with the "annual model change" activities of the American automobile industry. The scrapping of millions of dollars worth of tools after a few months of use in order to improve and change the model is momentous, he added. As contrasted with the European systems, he continued, in American plants, last year's knowledge must be reapplied again and again to modified situations. Constantly increasing standards of inspection and quality grow directly from this model change. The increase in horsepower, requiring tighter tolerances, different proc-

esses and equipment require that quality standards be remodeled constantly. "No other industry," he said, "undergoes such a drastic revision of standards, nor is it faced with such a variety of new and different quality problems as the automobile industry."

Suppliers Cooperate

Members of the automotive division, representing different companies among automotive products manufacturers as well as suppliers, work together to solve problems in which both the automotive industry and the suppliers are interested. An example of such a project, developed within this division, was "The First Report on Machine Tool Capability Studies." As described by B. C. Jacob, Jr., of Minneapolis-Moline Co., at a recent annual conference, a "Task Force" was set up within the division to study this type of problem. The Task Force included the Chief Engineers of two respected machine tool companies, the Master Mechanic of an automobile manufacturer, a Tool Engineer from another automobile manufacturer, a Statistician, a Chief Industrial Engineer and four Quality Control engineers from other automobile companies.

The pooled experience of these professionals in different aspects of the field yielded results. The objective of the Task Force, namely, reduction in risk of wrong decisions, was realized with the recommendation of the elements of a proposed system. The system was summarized in eight points, starting with recommendations concerning the size of total samples and concluding with a mathematical statement of machine tool capability determinations. Intermediate steps included recommendations for computing and plotting data processed in the studies.



ASQC OFFICERS AND DIRECTORS FOR 1959-60

(Front row, left to right)—A. V. Feigenbaum, vice-president; L. S. Eichelberger, vice-president; C. E. Fisher, president; Ellis R. Ott, vice-president; J. Y. McClure, vice-president. (Back row, left to right)—Leon Bass, director and past president; H. Davis Birch, executive director; Mason E. Westcott, chairman of editorial board; Gerald J. Liberman, executive director; A. W. Wortham, executive director; Allan M. Hull, treasurer; and David S. Chambers, executive secretary. (Executive directors not present are Allin P. Deacon and Warren R. Purcell)

Budd Company Cited

The effectiveness of operations within the Automotive Division is not limited to cooperations between automotive engineers and suppliers. Within the automotive industry itself, there is a continuous process of exchange of technical information on methods, from one plant to another. For example, J. Mehalek of The Budd Co., at a recent conference, described how 15 of the major automobile manufacturers and automotive stamping plants were contacted to obtain information concerning the use of quality control methods for improving the quality of stampings. In the compilation of information for purposes of a technical report, no reference was made to individual companies to distinguish one from another, except to list the names of all contributing companies at the end of the paper. The success of such programs is illustrated,

Mr. Mehalek said, by comparison of the permissible tolerances on stampings of some years ago at 1/32 in. and sometimes more, with current tolerances held at 1/64 in. and even less.

Understanding Needed

The future improvement of quality in automobile manufacturing will require more mutual understanding of the problems of both designers and production specialists, according to W. Frank Lynn of Ford Motor Co. In summarizing his recent exposition of the problems of quality control as applied to electrical systems, he said, "a number of things could be done to promote a better mutual understanding. Designers should get together and define the relationship between manufacturing variations and product performance, and agree on the ideal fit for a given function. They should then present this basic

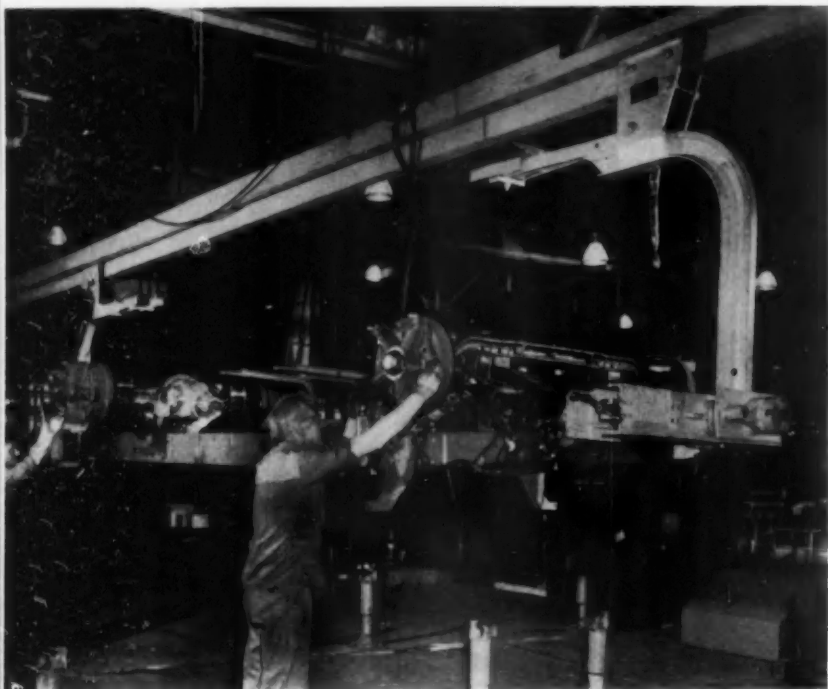
data in such a way that their colleagues in the plant can better appreciate the designer's point of view."

"Production engineers should get together and define the relationship between tolerance and production efficiency and present to the designers reliable information as to just what is practical and economic from a production standpoint."

Aids Vendor Relations

The activities of quality control specialists reach further than merely design and production, it was explained by the Automotive Division officers during the 1960 Conference. To illustrate this fact, they called attention to a report presented to the division in 1958 by W. M. Daley, Director of Purchases, Ternstedt Division, General Motors Corp. Mr. Daley said that this division instituted

(Turn to page 116, please)



Heavy duty chassis assembly has just been lifted off the pedestals on the first stage floor conveyor by means of the special roll-over fixture.

New Assembly DODGE

line, illustrated here, has a capacity of some four to five vehicles an hour, and can also accommodate military vehicles as a mix.

Heavy duty truck production involves some natural complications. One of these is requirement of a variety of chassis frames, differing in length and in detail. Up to now Dodge has been buying assembled frames but this has become impractical because of the difficulty of anticipating schedule requirements. Moreover, assembled frames also present a major problem of storage and handling.

With the new alignment of facilities, Dodge now buys heat-treated Parish rails and cross members according to specified lengths and assembles the frames in an area set aside for this purpose. They have about 14 standard length side rails, all pre-

MANAGEMENT people who have to do with the planning and scheduling of heavy duty motor truck production know too well that a comprehensive line-up of heavy duty vehicles involves hundreds of thousands, perhaps a million or more, variations in the options specified by the large fleet operators. Not only does this complicate the process of final assembly, it also interferes with the orderly operation of assembly lines where the heavies are mixed with the larger volume smaller vehicles.

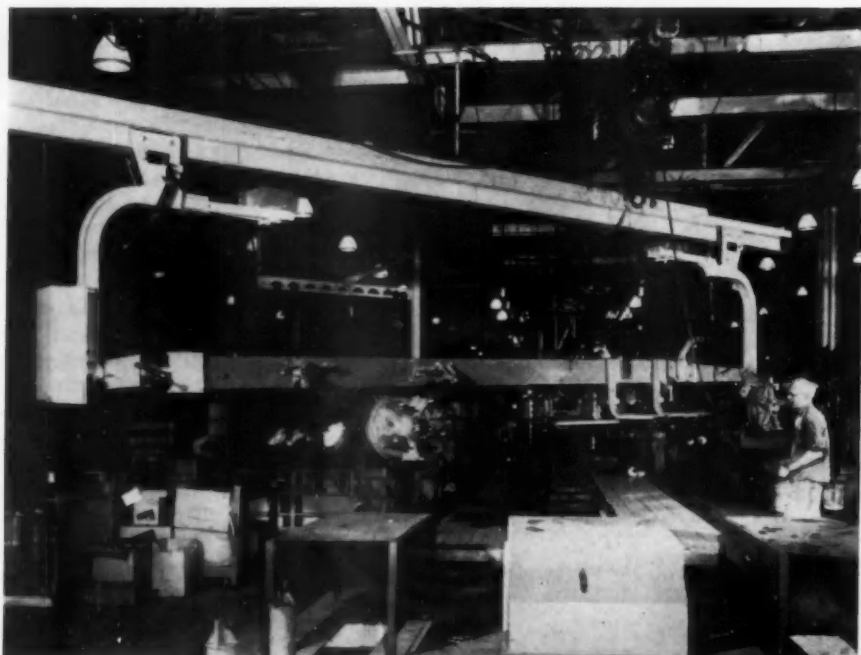
This problem was recognized by the management of the Dodge Truck Division for some time and positive steps were taken to change this picture with the introduction of the current line of heavy duty trucks and tractors. In fact, the change in procedure became mandatory with the more extensive range of models, capacities, and options now available to the fleet operators.

For example, the current line includes models in the range from Series 700 to 1000, plus four Cummins Diesel models as well. In GCW capacity the line ranges

from 38,000 - 76,800 - lb, together with a wide variety of wheelbase options.

To meet this situation Dodge Truck has set aside an entire building strictly for the assembly and testing of heavy duty models. The specialized final assembly

With the chassis fully rolled the fixture is moved forward to drop the chassis onto the second stage conveyor in the background. The fixture is guided in this maneuver by the overhead rails which converge to turn the fixture in a path parallel to the conveyor.



Facilities for Heavy Duty Trucks

By
Joseph Geschelin

DETROIT EDITOR



In this view the chassis has moved along the conveyor to a point near the engine dress-up line. Complete powerplants, prepared on the sub-assembly line, then are transported by hoist to the powerplant drop seen here.

punched by Parish to suit the assembly of brackets, hangers, and cross members. In addition, they buy long rails which are pre-punched only at the front end. These rails are then cut to suit the wheelbase of a given vehicle and the remaining holes at the rear end are drilled to suit the required pattern.

There is an even more critical aspect of this kind of manufacturing. That is the matter of driveshafts. Formerly Dodge bought complete driveshaft assemblies and stocked them against requirements. When you consider that Dodge Truck now has a variety of some 250 heavy-duty driveshafts, and has no way of anticipating the kind of mixes that may come up in even a day's run, you can appreciate the problem of scheduling and storing as well as possible delays when a certain length may not be available in the bank.

This problem too has been met head on by setting up a special drive shaft assembly department. Dodge now buys Spicer U-joints in sets and stores steel tubing in standard lengths. The compact department has all of the facilities required for making up as-

semblies of any specified length. There is equipment for cutting tubing to exact length; there is a flexible welding machine for making the seam welds for attachment of the U-joint; and there is a modern balancing machine for balancing each drive shaft assembly. It may be noted that the seam-welder employs the CO₂ welding technique.

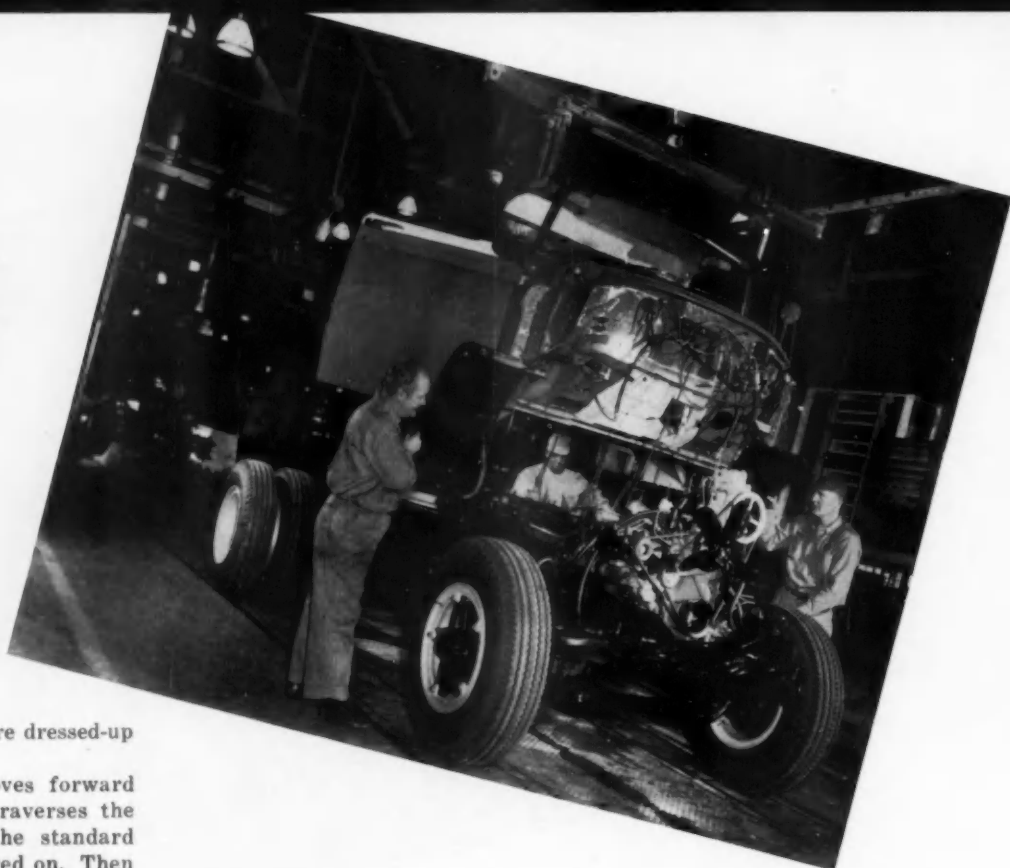
The sequence of illustrations shows the three principal phases of the final assembly line. The first phase marks the start of chassis assembly with frames laid up-side-down on the conveyor in the usual fashion to facilitate installation of front and rear suspension and rear axle. Here they had to solve the first obstacle—some simple means for turning over the heavy and lengthy chassis assembly. This is done by means of a special fixture, mount-

ed on two overhead hoists, and fully adjustable for frame length. The frame is held securely and when elevated it is flipped over by hand on trunnions.

It will be noted that the hoists operate on overhead rails. The rails are widespread, then converge over the next section of the assembly line. As one hoist leads, the front end of the frame moves toward the assembly conveyor, the rear end following. In the final maneuver, the frame is directly over the conveyor and is dropped.

The principal operation on this section of the line is engine installation. Engines are installed on a dress-up line, are fitted with the proper transmission, and are fully equipped with all engine accessories specified by the customer. The engine is dropped in the usual manner, as illustrated. Cummins Diesel engines, employed

Third and final section of the assembly line. At this point is seen the body drop with the cab ready for installation and buttoning up of all connections and fastenings.



in smaller numbers, are dressed-up on individual dollies.

As the chassis moves forward on the conveyor, it traverses the paint booth where the standard chassis paint is sprayed on. Then it goes through an infra-red tunnel for drying.

As the chassis leaves the drying oven, the wheels and tire assemblies are installed and a little farther along the conveyor the cab is dropped over the chassis. This is followed by the installation of all sheet metal and other parts. Fastenings are buttoned-up by operators working along the conveyor as well as in pits.

Even on this specialized assem-

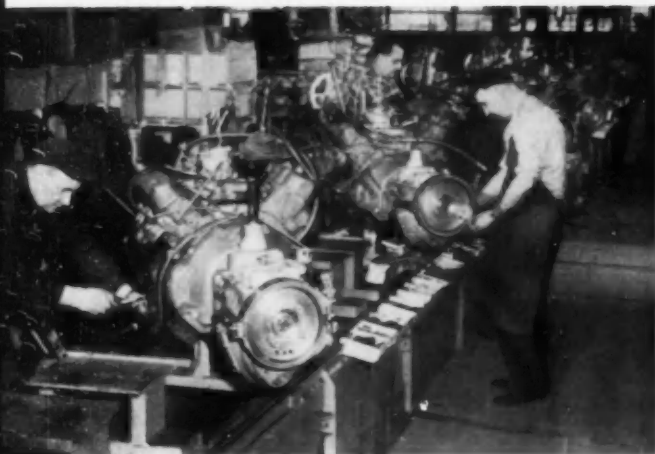
bly line, which is timed for four to five trucks an hour, there are many special items that would tie up its progress. For this reason they have a "custom" department to one side where the special items are installed after the vehicle has come off the line.

At the end of the line all vehicles are given a thorough inspection, necessary adjustments, and testing on the chassis dynamom-

eter. Then all vehicles are road-tested for distances up to 15 miles, a minimum average being about 10 miles.

As a further check on quality, the central quality control group subjects a sampling of production each day to a complete quality audit. This audit becomes an important factor in checking on the performance of each individual operator. ■

Engine dress-up line where the engines are fitted with specified transmissions and fully equipped with all standard and special accessories, ready for installation in a chassis.



Dodge heavies approaching the end of the assembly line.



PROFITING by the excellent co-operation achieved in the adoption of the building block concept for transfer machines, a much larger group of metalworking manufacturers, some 60 or more, laid the foundation for standardizing certain features of general purpose machine tools at a meeting in Detroit in March. This meeting of the Users General Purpose Machine Tool Standardization Group—which included representatives of Ford, General Motors, Chrysler, IHC, and other manufacturers in the automotive industries, as well as of other industries—also was attended by some 21 representatives of machine tool manufacturers.

R. L. Witsche of IHC, Chairman of the Coordinating Committee, emphasized that the proposal being presented to the group of machine tool builders on recommended areas of standardization was only a preliminary proposal and not one that the machine tool builders would have to accept. On the contrary, the objective of the user group is to present a need based upon experience and to work out a solution acceptable to all parties.

In support of the request for cooperative action, the user group quoted from the article "Program for Production USA" by Ludlow King, executive vice-president, Na-

Users Propose Standards For Machine Tools

By Joseph Geschelin
DETROIT EDITOR

tional Machine Tool Builders' Association in AI, September 1, 1959. The quote: "The Machine Tool Industry is more alert than ever before to customer problems. When a problem in one industry involves a problem in another industry, the logical thing to do is to get representatives of both industries together on a group basis."

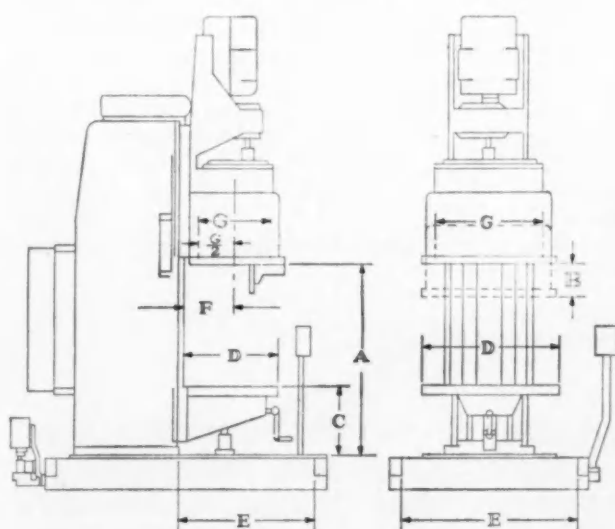
The objective of the user group is to effect a unification of industry standards, using existing standards, to encompass such areas of interest as tool attaching surfaces and fixture attaching surfaces so as to permit interchange of fixtures and tooling on equipment of similar character and rating even though it is supplied by different companies. In addition, they want standards to cover working heights.

Back of this is the problem common to all metalworking organizations—that, at present, a set of fixtures made for a specific make of machine cannot be transferred to a similar machine in the same plant, if the machine is of a different make. There is a consequent loss in time and money required in making a new fixture and supplying a different set of tooling. This is expensive in the normal course of events, dangerous in times of national emergency.

In essence, the user group would like to see machines of a given category and size, regardless of make, have the same minimum clearance for fixtures and tooling; have a standard table height; have tee-slots of the standard size, number, and spacing; have the same spindle taper, minimum table travel, etc. There may be other details, but these will indicate the approach.

The program does not contemplate an influence on design features or patented features unique to each make of machine tool; nor does it intend to inhibit creative engineering for the future. It does

(Turn to page 118, please)



AREAS RECOMMENDED FOR STANDARDIZATION ON MULTIPLE SPINDLE (ADJUSTABLE) DRILLS

- A—Based to head—max and min
- B—Stroke
- C—Base to table—max and min
- D—Table—work area
- E—Base—work area
- F—Centerline drill area to ways
- G—Head opening size
- Feed rate
- Rating chart—number of drills and size
- Max size per spindle



Trabant "Kombi" seats four people, with the cargo area accessible through the full-width rear door.

Communist Vehicles at Leipzig Fair

East Germany is Making Only Two Different Passenger Cars and Three Types of Trucks

THE impression gained at the recent Leipzig Fair is that the automobile industry remains one of the weakest sectors of the East German economy. While the Communist planners have poured investment funds into machine tools, mining equipment and other favored branches of engineering, achieving rapid advances in both production and technology, road

By David Scott

Special European Correspondent
for AUTOMOTIVE INDUSTRIES

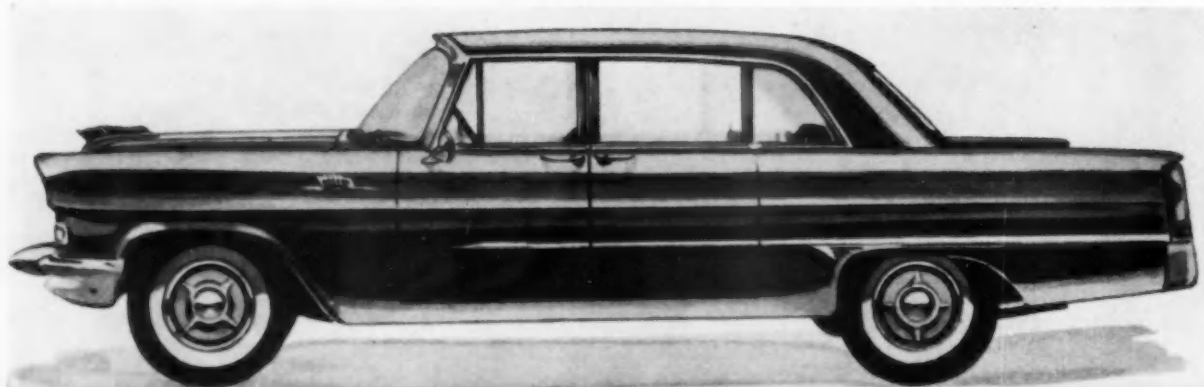
vehicles have had a low priority.

Although a doubling of output of this year's level is scheduled for 1965 at the end of the current 7-Year Plan, this still means an annual rate of only 147,000 cars and trucks for an industrialized coun-

try of 17 million people. Attempts are being made to narrow the production program, reducing costs despite small volumes by a division of labor among allied Communist states.

Thus East Germany is now making only two different passenger cars, and the variety of trucks (aside from military) has been reduced to three types, of 1-, 2½- and 4-ton capacity. As a result, manufacture of the small P-70 and larger Sachsenring car, and of all buses, has been dropped completely. Gaps in the range of domestic vehicles will be made up by imports

Chinese "Red Flag" car has a 334.65-cu. in. V-8 engine claimed to be of local design. Automatic transmission is standard equipment.



from Russia and Czechoslovakia.

Of the two remaining cars, main emphasis is on the baby 18-hp Trabant, which was shown at Leipzig in a new station wagon form. This four-seater has a load capacity of 720 lb, and like the sedan features unitary construction with a steel skeletal frame using fiberglass moldings for most of the exterior panels.

The 30.5-cu in. two-stroke engine drives the front wheels through an integral transmission, and incorporates an unusual interior heating system whereby warm air ducted from the blower-cooled engine is passed through a heat exchanger built into the exhaust pipe.

The Trabant is made at the Sachsenring Automobilwerke in Zwickau, where the decks have been cleared to concentrate on this one model. Present annual output is some 30,000, and is planned to reach 65,000 in 1965. Among the machine tool exhibits at the Fair was an automatic link-line for gears that is destined for this factory. It comprised a duplex hobber, twin-spindle deburrer, washer and shaver coupled together by gravity tracks, storage magazines and loaders to turn out one transmission spur gear a minute.

The larger 37-hp front drive Wartburg, manufactured at Eisenach, is unchanged except for minor improvements. Yearly production is now 32,000, with 50,000 set for 1965.

One new development among the East German trucks was a three-way dump body mounted on a hydraulic scissor-action elevating frame that can raise the 2.8-ton load to a height of 10 ft for tilting directly into a railway car or hopper. Made by Walter Hunger KG, this mechanism is built on a 4-ton Sachsenring chassis whose production has recently been transferred from Zwickau to a former bus factory at Werdau.

Among other Communist exhibits, China displayed its V8-engined Red Flag, which was claimed to be in series production although no figures were given. Standing on



Elevating dump body of this East German truck is first raised by a pair of hydraulic rams that extend the scissor-action elevator, then tilted by a trunnion-mounted cylinder.

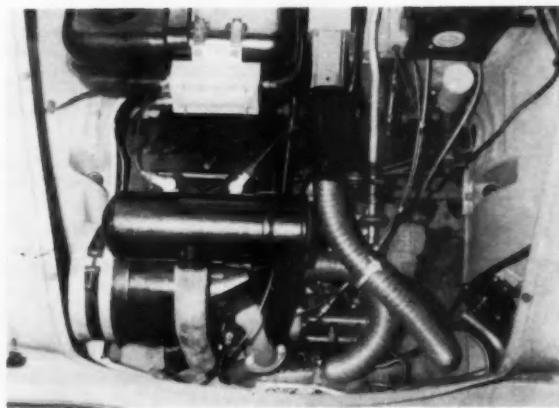
a 133.5-in. wheelbase and with a length of 226 in., this pre-compact American-sized vehicle is powered by a 220-hp engine, and includes automatic transmission, power brakes and steering, and a station-seeking radio as standard equipment.

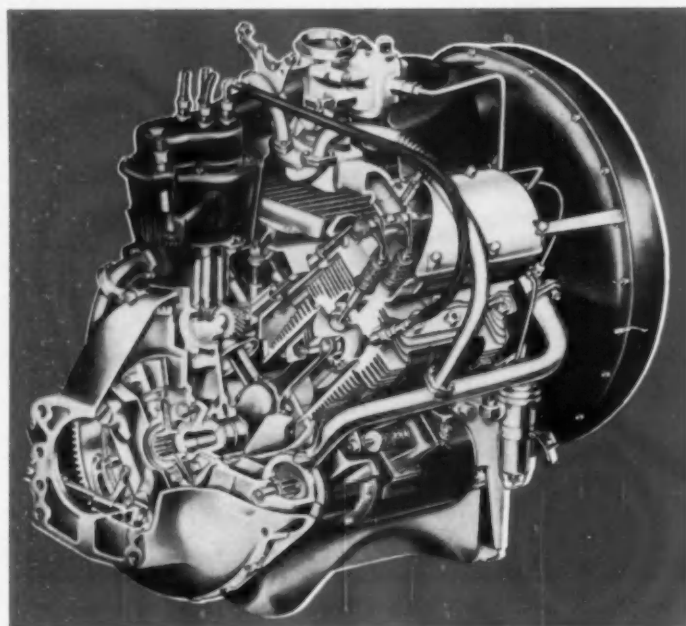
Russia presented the three-axle YAZ-219, a heavy-duty 12-ton truck powered by a 425-cu in. six-cylinder, two-stroke Diesel developing 180 hp at 2000 rpm. Drive to the rear bogie is through a 5-speed transmission with an overdrive high gear, inter-axle differential, and individual propeller shafts to the two axles which incorporate two-speed gearing.

Also on show was the Soviet ZIL-157 4½-ton six-by-six that features a system for deflating and inflating the tires from the cab while the truck is on the move, thereby increasing traction on soft surfaces. Air is ducted from the large-section 12.00 x 18 tires via sealed annular channels in each of the six hubs, and is supplied from the engine-driven compressor through separate valves for the individual wheels.

Rumania exhibited one of the first buses made in that country, a 33-passenger coach powered by a Russian-designed 338-cu in. L-head gasoline engine mounted at the rear.

Blower-cooled Trabant engine incorporates a heat exchanger (extreme bottom of the picture) in the exhaust system, which raises the temperature of air ducted from the small two-cylinder unit before it is piped into the body for warming the interior.





Cutaway view of the all-aluminum Mighty Mite engine

Design Details of the MIGHTY MITE Aluminum Engine

By Joseph Geschelin

DETROIT EDITOR

CONSIDERING the widespread interest in aluminum engines for passenger cars, it may be instructive to look at the basic design detail of the small V-4, air-cooled all-aluminum engine being built by American Motors Corp. for powering the Mighty Mite vehicle for the Marine Corps. An earlier version of this engine was described in *AUTOMOTIVE INDUSTRIES* August 15 and September 1, 1956.

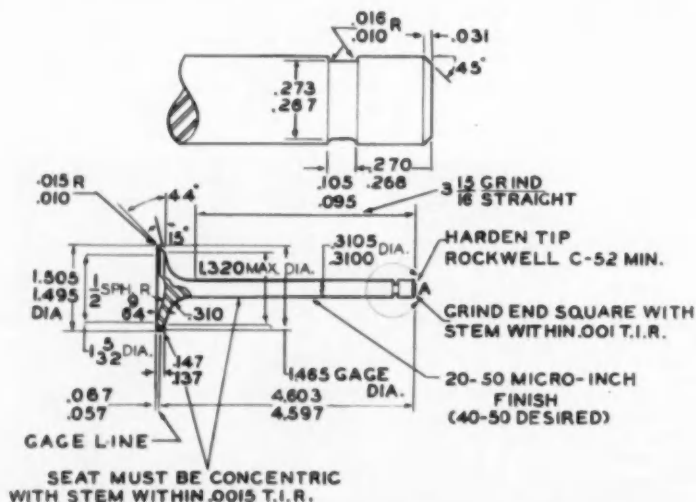
Most of the design features may

be appraised from the principal cross-sections of the engine reproduced here. The basic structure consists of a rugged aluminum crankcase, individual cylinder barrels, and two cylinder heads which serve to tie the structure into an integral block by means of the long through bolts.

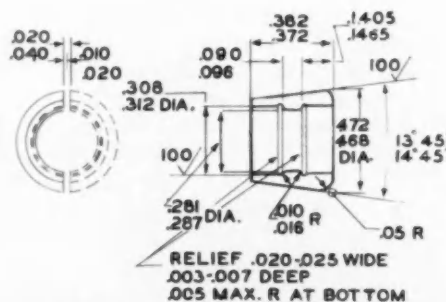
Because of limited production volume for the initial Government contract, crankcase and cylinder heads are aluminum sand castings.

One of the most distinctive features is the die-cast cylinder barrel, produced for AMC by Doehler-Jarvis, ready for installation. We are told that Doehler-Jarvis employs some special techniques which make it possible to produce this casting without any draft or taper in the cylinder bore. Moreover, dimensional tolerances are held so closely that no further machining of the bore is required, except for a single-hone as-cast.

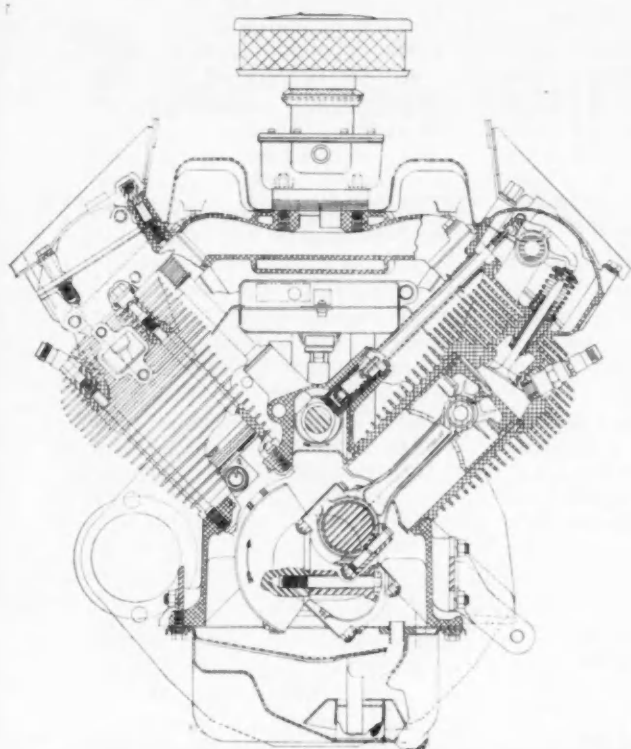
For military requirements the cylinder barrel is given a porous, hard chromium coating, developed by Doehler-Jarvis and produced at its Grand Rapids plant. Plating is



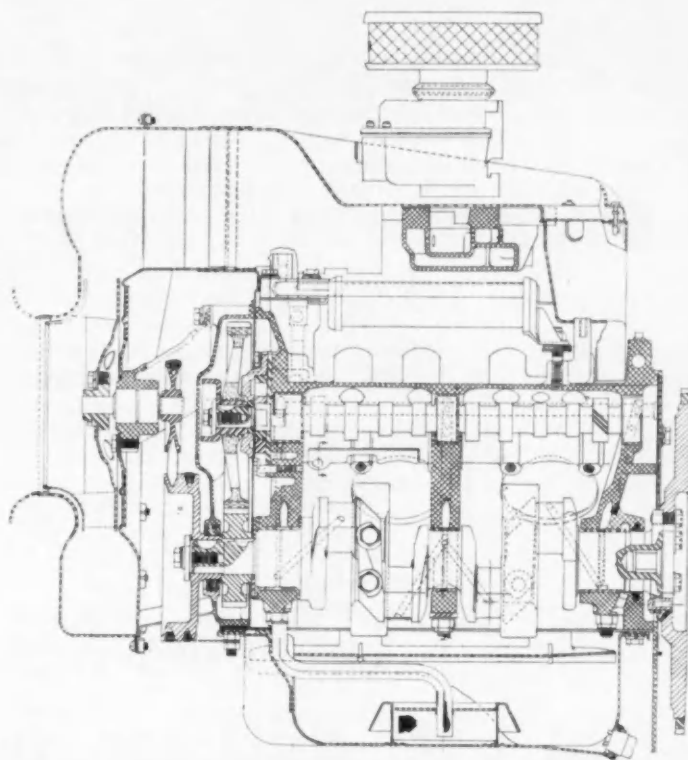
Intake Valve



Valve spring key (Intake)



Transverse section of military version of the Mighty Mite



Longitudinal section of the Mighty Mite

done over the honed surface, then the coating is honed to a specified pattern. This is obviously an expensive surface treatment and is one of the details that would require change if a civilian version of the engine were to be produced.

The crankshaft is made of a steel forging, fitted with bolted on counter-weights. Main and connecting rod bearings are of tri-metal type, produced by Cleveland Graphite Bronze.

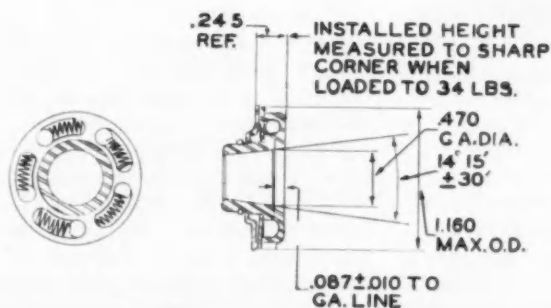
Camshaft drive is of conven-

tional gear type, employing a forged camshaft. Valve push-rods are actuated by Eaton hydraulic valve lifters, the latter being provided with low pressure oil from the oil pressure feed to the rocker arms. This oil is fed down the hollow push-rods.

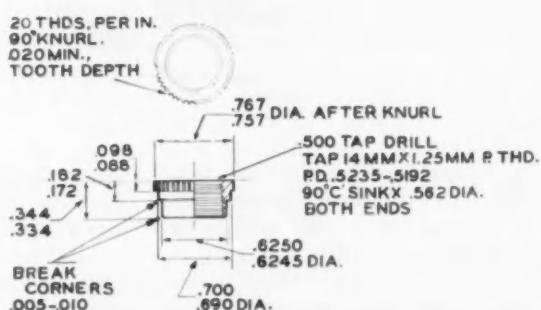
Both intake and exhaust valves are provided with Thompson-Products positive valve rotators. Inserted, hardened valve seats are provided for both intake and exhaust valves as indicated.

The combustion chamber, as shown in the transverse cross-section, has a modified wedge shape geometry with a squish area on the side opposite the spark plug. The spark plug is of military type, seated in a Rosan insert.

Pressure lubrication is supplied by means of an Eaton Gerotor pump, driven off the front end of the camshaft. Oil under pressure is supplied to the main and rod bearings, camshaft bearings, and rocker arm bearings. Crankcase



Rotocap assembly for valve



Insert for spark plug hole in cylinder head

oil is filtered through a full flow oil filter; and is diverted through an oil cooler located over the center of the V. Flow through the oil cooler is controlled thermostatically in such fashion as to maintain uniform crankcase oil temperature within narrow limits.

The military version described here has a bore of 3.25 in., stroke of 3.25 in. producing a square pattern which results in high mechanical efficiency and long life. Combustion chamber geometry has been tailored to a compression ratio of but 7.5 to 1 so as to take advantage of any of the regular fuels

available at military depots. Obviously, both compression ratio and combustion chamber configuration can be suitably modified for a civilian version with greater bhp/cu in. capabilities.

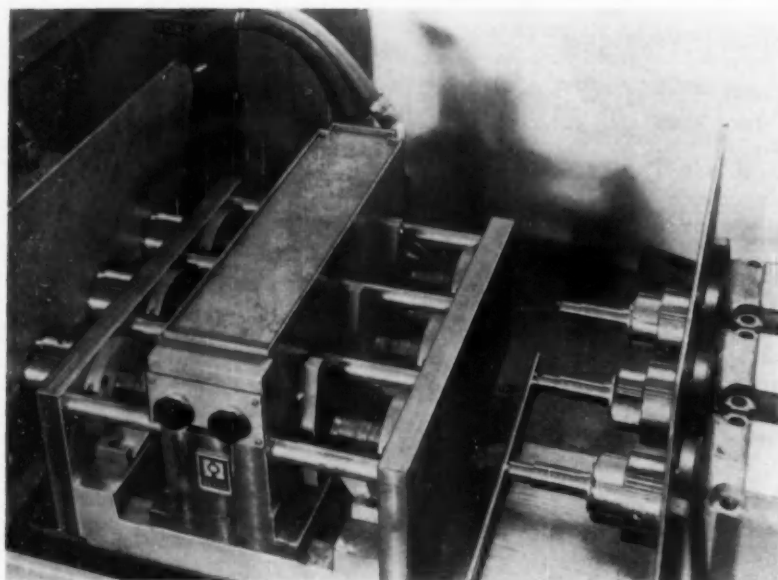
The present engine is rated 55 hp at 3600 rpm (max.), with maximum torque of 90 lb ft at 2000-3000 rpm. Incidentally, torque is another feature specially tailored for the military version where a relatively flat torque curve is required.

In keeping with military requirements, this engine is completely water-proof and weather-proof,

capable of operating when submerged. It is equipped with the military 24-volt system together with specified shielding.

The longitudinal section arrangement of the timing gear drive for the camshaft, the Gerotor oil pump mounted off the end of the camshaft, and the V-belt drive for the air cooling system fan. The latter is housed within the shroud which is seen in better detail in the cutaway view. This shows many features, including shrouding, carburetor, starter, distributor, and the oil cooler which may be seen directly beneath the carburetor. ■

Brake Cylinders Bored at Over 400 per Hour



Clamping fixture to hold six rear wheel brake cylinders on Heald 222 Bore-Matic

ASIX-STATION setup at Chrysler's Highland Park plant is precision-boring 405 gray iron rear wheel brake cylinders per hour at 75 per cent efficiency.

A hydraulically operated clamping fixture holds six parts, three on each side in a Heald 222 Bore-

Matic. Each station is interlocked so that the table can't move in unless all parts are clamped.

Although this is an "end stop" cycle, two memory push buttons—one for each side—make the cycle continuous. While the parts on one side are being bored, the operator

loads and unloads the other and pushes the memory button. Boring completed, the heads stop and the tools retract while tools on the opposite side reset.

The table automatically reverses and the timer unclamps the finished parts when the tools are clear. The opposite side is then clamped while the table hesitates at center stop and the table advances and slows down to finish bore.

Stock removal is 0.036 in. and tolerance is plus-minus 0.0005 in. The back-to-back hydraulic clamping fixture has Stellite-faced wear surfaces. ■

Series 40 Jetliner Wins FAA Approval

A fourth version of the DC-8 Jetliner, the Series 40, has been granted a type certificate by the Federal Aviation Agency.

Equipped with four Rolls-Royce Conway engines which deliver 17,500 lbs. of static thrust each, the Series 40 is the most powerful and fastest model of the Douglas transport to be approved for airline service.

The Conway engines permit the DC-8, at its maximum take-off weight of 310,000 lbs., to operate from runways only 9,750 ft. long. At maximum cruise thrust the Series 40 will have a level flight speed of 593 mph. Its range is more than 5,400 miles.

Current Developments Discussed at SAE National Automobile Week Meeting

PROCEEDINGS at the SAE National Automobile Week meeting in Detroit last month were strictly business and covered 12 individual sessions as well as a luncheon meeting addressed by J. N. Bauman, president of White Motor Co. The meeting was well attended, registration being something over 900, while the luncheon meeting drew an attendance of some 250.

Briefly, the sessions included the following general topics: suspension for integral bodies; new engineering materials; discussion of SAE body and chassis frame drafting standards; GM's ride simulator; adhesives; recent developments in ventilating, heating, and air conditioning; corrosion problems; aerodynamics; gear metallurgy; fuel economy factors; compact cars.

It will be recognized that in general the subject matter represented reports on current developments rather than advanced projects. The session on new materials was in the form of a panel presentation, the gist of what went on being reported here in full.

The panel session on new developments in materials, with Joseph Gurski of Ford Motor Co. as chairman, covered the highlights of steel, aluminum, electroplating, plastics, rubber and synthetic rubber-like materials. It was exceedingly well attended, considering the competition of two other simultaneous sessions.

According to C. F. Nixon of General Motors Research, the art of electroplating was advanced materially by the development of two basic accelerated corrosion tests. These tests have resulted in greater reliability, making recommendations much more effective than heretofore. In general, there is a tendency to specify thicker chro-

By Joseph Geschelin

DETROIT EDITOR

mium deposits, up to 150-millionths in thickness, with an average coating of 30 to 40 millionths of an inch.

GMR has adopted the Cass accelerated corrosion test procedure of 16-hours duration for plated steel parts and die castings. GMR is working now on an accelerated test procedure for anodized aluminum parts.

A look at changing steel requirements was presented by M. F. Garwood of Chrysler. He pointed out that steel in coils now dominates in the area of large volume press shop operation, due to automation methods. For deep drawing there is a greater demand for aluminum killed steel to provide for better drawing quality and better control of structure.

In general, Garwood finds that carbon steels are replacing alloy steels for many applications. Utilization of these lower priced grades has been aided materially through the use of induction hardening and flame hardening techniques. On the other hand, Chrysler still employs alloy steels for differential and manual shift transmission gearing.

Cold forming—cold extrusion—applications are growing and are employed wherever feasible. Their chief advantage is in lower scrap losses, better quality, and excellent core properties.

According to Garwood there is a definite trend to reduce the number of active steel grades required by a manufacturer. He also mentioned the use of carbonitriding on cheaper grades of carbon steels; and a new technique of suspended carburization employing a neutral atmosphere at lower temperature.

Chrysler is experimenting with a Sperry Reflectoscope sheet steel scanner in an effort to develop a rapid and automatic inspection of steel quality at the Nine-Mile stamping plant.

Speaking about unitized bodies, Garwood believes that differentially coated galvanized sheet may predominate in the areas subject to corrosion.

Noting that 1960 cars have about 20 lb of plastics per car on the average, J. D. Young of DuPont predicted that the usage of plastics is expected to rise to 40 to 50 lb per car in the near future. He made two important points in this connection: that engineers must design specifically for plastic parts if the application is to achieve maximum economy; and noted that organic chemists now are on the road in the successful tailoring of giant molecules—polymerization—for specific applications.

Young cited several very successful applications on 1960 cars. One of these is a Delrin molded washer pump body on a windshield wiper; another is the Ford seat side shield, extruded from polyethylene. It saves weight and cost by comparison with the former steel stamping, and provides better eye appeal as well.

There is a great deal of interest in nylon bearings for ball joint suspension assemblies; and nylon tubing for truck fuel lines. One of the most promising of the new developments is a polycarbonate formulation which can be cold-formed to make body panels.

Speaking on the subject of tailoring of long chain polymers, Gilbert Swart of General Tire presented an exciting picture of the latest developments in the field of synthetic rubber and plastics. While
(Turn to page 145, please)

Preview of the

1960

Tool Show of the ASTME

... Tooling for Productivity ...

By C. J. Kelly
ASSISTANT EDITOR

FOR the first time since its inception the American Society of Tool Engineers has changed its name. This was done to bring recognition to the importance of manufacturing engineers in the field of tooling technology. The visitors to this year's tool show will be greeted by placards bearing the new designation . . . ASTME . . . American Society of Tool and Manufacturing Engineers.

For this year's conference the society has scheduled a series of 35 seminars, panels, symposia, "Techtours," and technical sessions to give tool and manufacturing engineers the most up to date information in creative manufacturing techniques. All technical sessions will be held in Detroit's Sheraton-Cadillac Hotel. In addition to the conference the society will sponsor a Tool Exhibit at the Detroit Artillery Armory that will cover seven acres.

This year's tool show will undoubtedly be the biggest and best ever presented. Over 6000 examples of up to date machines, tools and manufacturing equipment, worth 15 million dollars, will be on display. More than 35,000 manufacturing executives, managers, supervisors, and engineers will see 900 products never before shown publicly, and 1300 machines and devices developed in the last year.

With a keen eye to the future, society members and visiting executives from all parts of the country will be occupied in absorbing and evaluating the wealth of product and engineering information made available from exhibits and technical meetings. Much emphasis will be placed on more extensive and better methods of quality control.

Many new automated techniques, processes and equipment will be unveiled for the first time pointing to the rapid advances in technological improvements being made in the automotive and machine tool industry.

Dr. Allen V. Astin, Director, Bureau of Standards, United States Department of Commerce, Washington, D. C., will be presented with the annual Eli Whitney award presented by the American Society of Tool and Manufacturing Engineers. Dr. Astin will present the Eli Whitney lecture at a luncheon on Monday, April 25, at the Statler Hilton Hotel in Detroit. Other society award recipients will be honored at the honor award dinner, Saturday, April 23, Sheraton-Cadillac Hotel's Grand Ballroom.

The tool exhibit hours will be as follows: Thursday through Saturday, 9:00 a.m. to 6:00 p.m.—closed Sunday—Monday and Tuesday, 1:00 p.m. to 10:00 p.m.—Wednesday and Thursday, 9:00 a.m. to 6:00 p.m. An ASTME center will be in operation during all hours the exhibit is open, and will have available complete information concerning the society and its activities.

Seventeen interesting and educational plant tours have been scheduled during the period of the conference and tool show. They will be to: The Ford Plant; Ex-Cell-O Corp.; The Star Cutter Co.; Chrysler Corp. of Canada; Ojibway Salt Mines of Canada; General Motors Corp.; Chrysler Corp.; Ford Motor Co.; Chevrolet Plant; Argus Camera Div., Sylvania Corp.; Enrico Atomic Energy Plant; Burroughs Corp.; and Great Lakes Steel Co.



What's **NEW** at the

ASTME TOOL SHOW



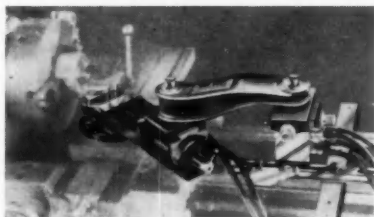
DETROIT . .

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Tracing Attachment

Introduced for the first time, a new lathe tracing attachment will be featured in the booth displaying the True-Trace Corporation's products. This device is called the Model Mark II. It is of the pivot-type design and is suitable for both shaft and facing duplication. The system

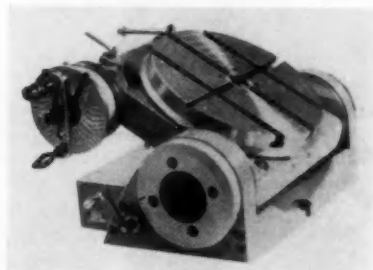


is entirely hydraulic in operation. According to True-Trace the application of the unit to existing machine tools will require no machine conversion and takes only minutes to install. *Booth 1831.*

Circle 225 on postcard for more data

Dividing Tables

A new line of tilting-rotary and horizontal-vertical dividing tables and heads will be introduced for the first time at the tool show. The trade name given to this line is Walter.



The model illustrated is accurate to 30 seconds and vernier reading of this series is six seconds. Other features include: hardened, precision worm gears; constant immersion of

all gears in oil; positive locking devices on all movements; and correcting mechanisms. The Carl A. Neise Co. will hold their exhibit in *Booth 1561.*

Circle 226 on postcard for more data

Automatic Assembly

Ferguson Machine Corporation will emphasize standardization in machine components and machinery including the machine tool concept of standardization for automatic assembly and mass production equipment at the 1960 tool show.

New developments are centered around standard plate, face, end and

other types of cams; improved power transmission systems and standard placing stations of integral and modular designs for use with basic rotary or in-line transfer machines.

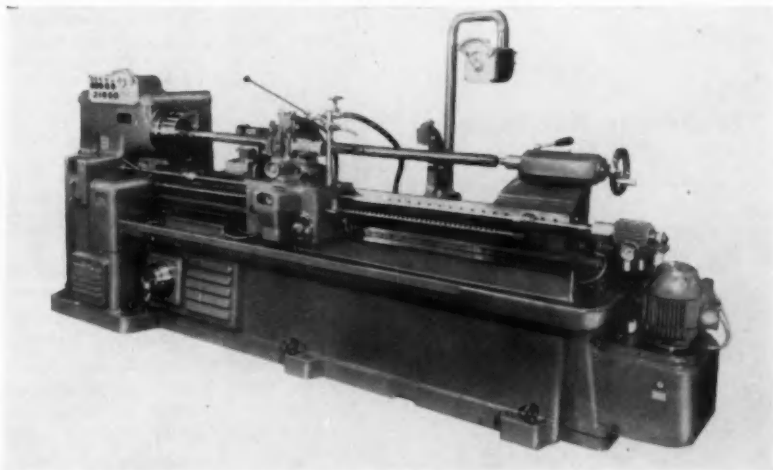
Intermittent assembly machines will be shown with standard integral placing stations positively timed by the machine through mechanical drives and providing reciprocating, oscillating and "square" motions for adaptations to push-&-guide and pick-&-place mechanisms. Standard modular stations, which may be moved from one location to another, or to other machines, will also be demonstrated while mounted on the index table. *Booth 1461.*

Circle 227 on postcard for more data

Automatic Lathe Features 80 in. Threading Stroke

Man-Au-Cycle Corporation of America will unveil its new automatic cycle threading lathe at the show. This unit offers an 80 in. stroke and 84 in. between centers. Internal and external threading operations are possible in which feeds,

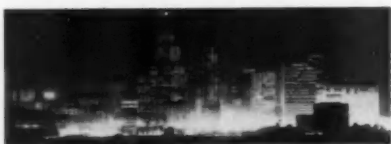
speeds and the number of passes are preselected. By the employment of additional attachments tracing, facing, turning, chamfering, shouldering, boring and cutoff can be accomplished in the same single chucking operation. *Booth 2031.*



This new lathe features a geared head, Square D electrics and Timken bearings
Circle 228 on postcard for more data

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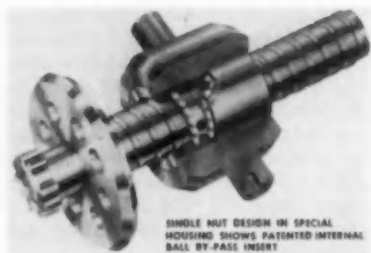
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Anti-Friction Bearings

The Scully-Jones booth will demonstrate recirculating anti-friction Tychoway bearings and Super-Cision ball screws designed for supporting machine components moving in a straight line, and for positioning them with a minimum of mechanical force. Used together, they help make



linear motions completely predictable, accurate and repeatable.

These automatic recessing tools have new simplified adjusting collar with interchangeable stop collars and pilot nose assemblies to quickly adapt one tool to pilot either in a fixture bushing or the work. They have been developed to increase the versatility of drill presses, radial drills and other machines for fast and accurate grooving, necking, chamfering and recessing operations. Booth 1127.

Circle 229 on postcard for more data

Pneumatic Nut-Setters

A complete line of hand grinders and nut setting tools will be shown at



the show. Among these will be the new pneumatically operated nutsetter model 400 RNP. This unit is designed

with a pistol-grip type handle and features a reversible drive. This drive is located at the back end of the tool for added convenience. All models are available in four speeds and are furnished with either adjustable or positive clutch or direct drive. This line is being introduced by the Airetool Mfg. Co. Booth 1734.

Circle 230 on postcard for more data

Small Part Milling

This new precision machine applies automation techniques to the high speed production milling of small parts in large quantities. Designated AutomaticMILL, it employs a powerful chain drive to continuously move a matched set of holding fixtures at such variable predetermined speeds that 1,000 to 6,000 parts are precision machined in a single hour, according to the manufacturer. The design and closely held machine tolerances allow the AutomaticMILL to perform a wide range of milling operations on varied shaped parts with dimensional accuracies duplicated within 0.001 in. The unit can be attached to the bed of any milling machine, while a low cost self-contained unit can be obtained with a "built in" precision milling head. This is a product of Sieburg Industries, Inc. Booth 2121.

Circle 231 on postcard for more data

New Tool Lines

Erickson Tool Company will introduce a new line of spade drills, new push on arbors, recessing tool holders, and gear-holding chucks at the Show. In addition, their full line of precision holding tools, indexers and master spacers, boring bars and core drills, air chucks and cylinders will be shown. Automatic indexing will be demonstrated. A turret lathe will be in operation to demonstrate air cylinders, quick change holders and new improved floating holders. Booth 1031.

Circle 232 on postcard for more data

Testing Devices

Steel City Testing Machines, Inc., will display a complete line of test equipment during the week of the Show in Detroit. Highlights of the exhibit will be new tensile-testing machines and units that permit hardness tests to be incorporated in automatic production lines.

As industry prepares "Tooling for Productivity," more attention must be given to material specifications and the protection of expensive tools. Various physical-property-testing equipment will be on display, in operating condition, to show tool engineers what can be done to simplify material inspection and to automate inspection procedures.

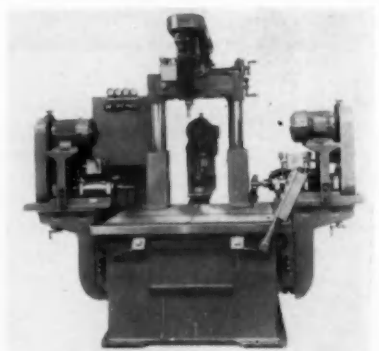
In addition to the new line of tensile-testing machines, test equipment for determining hardness and ductility, and proving rings will be exhibited. Booth 1526.

Circle 233 on postcard for more data

Five-Side Machining

A new drilling, tapping, boring, reaming and spot-facing machine, which will perform operations on as many as five sides of a part in one work cycle, is to be introduced at the ASTME Tool Show.

Designated the Wis-Matic, it is available with any combination of one to four horizontal power units and one vertical power unit. Each power unit is adjustable in the ver-



tical lateral and longitudinal planes, and all vertical adjustments are counterbalanced so that they may be positioned accurately.

These power units can be run independently of the others, and a cycle selector, in the electrical control panel, makes it possible to actuate power units on the first or second pass or in any multiples. The Wisconsin Drill Head Company will occupy Booth 621.

Circle 234 on postcard for more data

Ceramax Rotary Chuck

A new rotary, permanent, ceramic magnetic chuck will be introduced at the show in Detroit. The new chuck is so powerful magnetically that it can be used safely for lathe work as well as grinding, according to the manufacturer. A special "lock" safety feature insures positive magnetic holding under the most rapid start and stop conditions. Variable



holding power is provided for easy work positioning. This magnetic Chuck also features an all-steel top plate. No electrical accessories are necessary. O. S. Walker Company, Inc. will display this unit in Booth 2242.

Circle 235 on postcard for more data

Thickness Measuring

A fully transistorized battery-powered Sonizon SO-200 will be introduced at the tool show. This direct-reading unit measures thickness of steel, brass, nickel, copper, aluminum, and almost every other material which transmits ultrasonic sound. By placing a probe on the surface of the piece to be measured and rotating a dial, the unit gives an instantaneous reading of thickness. Improved features include a rugged chassis, greater sensitivity, and easier read-out. The Magnaflux Corporation will introduce this testing device in Booth 326.

Circle 236 on postcard for more data

Stamping Display

In addition to large displays of standard short run stampings and various metals and plastic materials, Federal Tool and Manufacturing Co. will show parts done with its new Combin-O Process. The new short run stamping method permits Federal to eliminate from one to four operations over those previously used. Spe-

cial short run stamping dies enable a number of forming operations to be combined into one. One stamping which formerly required seven operations is now completed in three. One which required five operations is now done in two. There are considerable time savings which, of course, are reflected in lower stamping costs. Booth 950.

Circle 237 on postcard for more data

Transistorized Gages

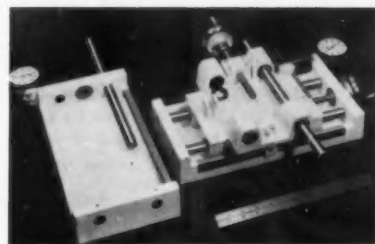
A compact control unit for air-electric machine control gages, which incorporates all of the elements formerly housed in three separate enclosures will be demonstrated in actual use at the Federal Products Corporation booth.

By using transistors rather than thyatron tubes and designing the wired circuit to occupy the smallest possible space, this new air-electric control unit now contains more equipment, yet occupies just a quarter of the space, formerly needed. The complete control unit consists of an air-electric switch with meter, a set of three signal lights, a master pressure gage, two circuit indicators, a test-run switch, a set up-run switch, an on-off switch, and a two limit signal unit. Booth 1000

Circle 238 on postcard for more data

Automation Control

Tracer Control Company will be exhibiting their "E" Series Duplomatic tracer attachment at the Show. The unit is designed to automate milling machines, lathes, boring mills for automatic and pencil trace machining. These devices can operate in two or three dimensions and maintain precision tolerances at speeds limited only by the capabilities of the machine tool.



Also shown will be a new 2-way adjusting compound for precision holding and locating of work pieces. Dial indicators and adjusting rods compensate for backlash and allow adjustments to tolerances of 0.0001 in. Other Tracer products to be exhibited include: a standard hydraulic probe unit designed for single axis tracing; and a 2-speed precision gear box that can be used with either hydraulic or electric motors. Booth 2220.

Circle 239 on postcard for more data

Completely Transistorized Machine Tool Control

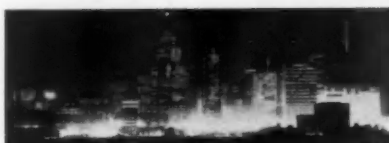
Hughes Aircraft Co. reports their new numerical control has repeatable accuracy of 0.0002 in. The control is designed to perform automatically such machining jobs as drilling, boring, turning, riveting, spot welding, punching, eyelet inserting, and similar operations. To allow for initial checkout of machining runs, this unit can be set to operate manually and semi-automatically, as well as fully automatically. Because of the low power requirements of the transistorized circuitry, total power requirements for the Hughes control unit have been greatly reduced. This control plus the drive motors require less than seven amps. A third axis feed control can be added to the unit, if desired. Booth 2117.



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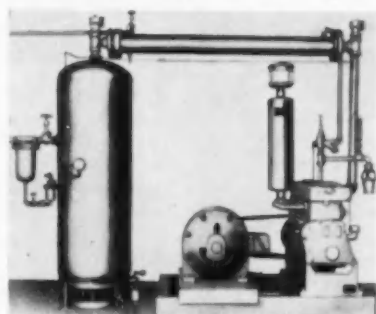
DETROIT . .

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Air Compressor Line

Schramm, Inc., will be featuring its line of Unistage industrial air compressors at the tool show this year. As at previous tool shows, Schramm will be equipped to meet the air requirements of other exhibi-



tors. To demonstrate the flexibility of Unistage compressors, air will be supplied directly from the Schramm booth by a battery composed of individual units of different capacities.

These air systems release for other uses the valuable plant space taken

up by the bulky compressors of a central distribution system. According to the manufacturers their compact size not only allows installation right in the areas where air is used but also saves the cost of extensive piping systems. Because all reciprocating parts are fundamentally balanced, these compressors are unusually quiet and so free of vibration that special foundations are not required. In most cases, they can be bolted directly to the floor. *Booth 2143.*

Circle 240 on postcard for more data

Inspection Instruments

A wide variety of Borescope inspection instruments will be displayed at the tool show by National Electric Instrument Division of Englehard Industries, Inc.

The Borescopes, which are much like miniature, illuminated periscopes, are widely used by quality control engineers, project tool engineers, maintenance men and others to closely inspect otherwise impossible-to-see interior surfaces. One example is the

inspection of cylinder walls in aircraft and automotive engines by merely removing the spark plugs instead of the cylinder heads.

Instruments to be shown vary in diameter from 0.095 to 1.000 in. and provide vision in various directions. Units of .450 in. diameter and larger will be displayed in sectional form and with various interchangeable viewing heads. Versatility of the system will be indicated by a number of Borescopes developed for special purposes. *Booth 2144.*

Circle 241 on postcard for more data

New Clamp Line

Three new plunger-type toggle clamps and an expanded and improved line of miniature and pneumatically operated clamps will be the featured display at the 1960 ASTME Tool Show by Detroit Stamping Co.

Models 601 and 601-0 were designed principally for general-purpose use in light assembly work of the electronics, aircraft and allied industries. Both clamps lock in either an extended or retracted position.



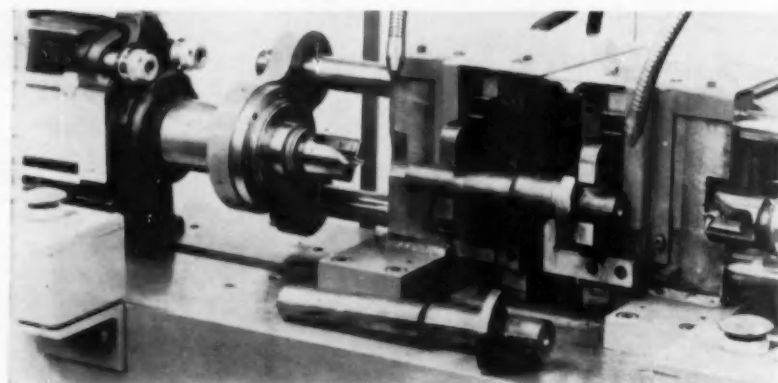
MODEL—601

Model 601 has a tapped hole in the plunger to take a rubber-tipped adjustment spindle and a lock nut for extending or shortening its reach. The 601-0 has a $\frac{1}{4}$ -20 thread on the plunger end to allow easy positioning of various holding devices. Rated holding pressure of both clamps is 95 lb.

The model 606, with a rated holding pressure of 450 lb for medium duty holding applications, features a swivelling handle and a narrow base for use where clearance requirements do not permit using conventionally designed clamps. The handle swivels in a 220 deg arc and can be fixed in any position within this arc by a lock-nut located on the axis of rotation. A tapped hole in the plunger allows the use of an adjusting spindle for extending its reach. *Booth 1054.*

Circle 243 on postcard for more data

Simultaneously Machining Both Ends of a Crankshaft



This machine will face and chamfer both ends of a crankshaft at the same time. It is adjustable to handle various size workpieces and will hold tolerances of ± 0.001 in. Diameter changes are accomplished by changing the jaws. This unit, along with other machines sponsored by House Machine, Inc., will be on display in Booth 943

Circle 242 on postcard for more data

New Steel Products

Mock-up models of new applications for plastic mold and die steels, together with samples and products made from many speciality steels will be presented by Crucible Steel Company of America. Twenty five display panels will show one or more of the sixteen thousand items manufactured by Crucible. Included in the display will be stainless steel, high alloy pipe and tubing, titanium, vacuum melted metals and permanent magnets. *Booth 660.*

Circle 244 on postcard for more data

Numerical Control

All phases of drilling, tapping, reaming and counterboring operations can be fully controlled and programmed by a new line of numerically controlled drilling machines. These machine tools, designed and developed by Hillyer Corporation,



permit spindle speed, feed rate and depth settings to be fully controlled by both tape and dial along with conventional x and y coordinates.

As in the case of their turret models, any combination of these three settings may be selected for any spindle at any time. This permits a given tool to be programmed to varying levels and varying depth of holes, all on the same work piece. *Booth 304.*

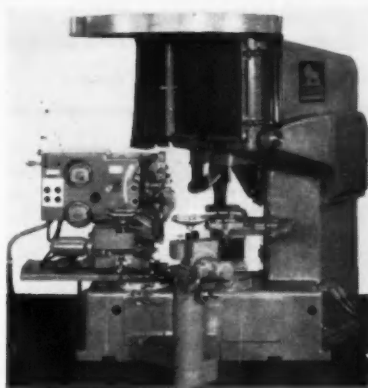
Circle 246 on postcard for more data

Optical Profile Grinder

Eric R. Bachmann Co., Inc., will have on display a model of the Loewe grinder. This company is the sole distributor of the line.

The machine features a 20 by 20 in. shadowgraph screen with two magnifications of 25X and 50X. The

grinding wheel slide has a stroke of 3 5/16 in. and allows adjustments



for lateral relief angles of 15 deg and axial relief angles up to 35 deg; any compound angles within these ranges also can be ground. The machine has two optical systems: one for shadowgraph projection and one for reflection projection.

The drives for the grinding wheel spindle and the stroke are infinitely variable through DC motors. Combining a shadowgraph comparator with a highly accurate form tool grinder facilitates greatly and speeds up considerably the grinding of the most complicated irregular contours by operating the two compound slides of the grinding wheelhead simultaneously or independently. *Booth 1055.*

Circle 245 on postcard for more data

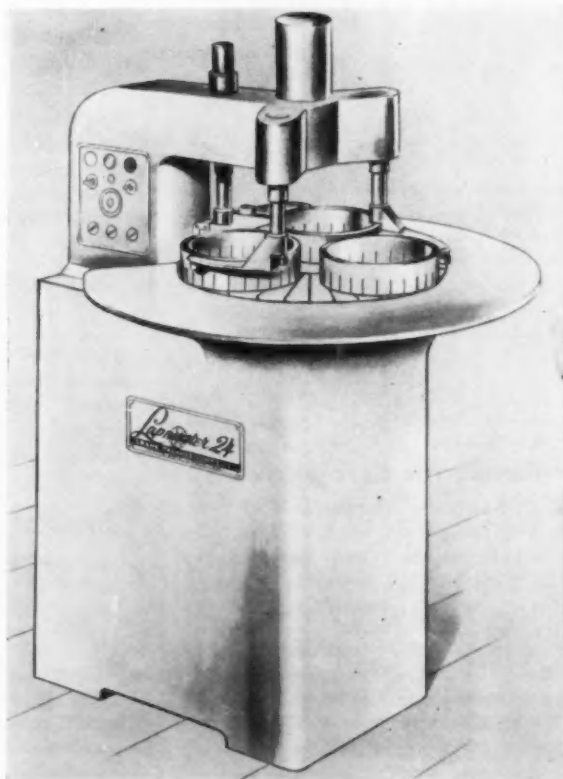
Control Automatically Checks Lap Plate Flatness

Model 24 is the designation given to the new control for automatically checking and maintaining lap plate flatness. This electro-mechanical device assures automatic quality control within extremely close tolerances. It incorporates an exclusive three point sensing head capable of detecting errors in lap plate trueness within one light band (0.0000116 in.)

on a three in. section. If errors are present, the control unit operates an electric motor drive, automatically shifting the conditioning rings in-board or outboard to compensate for any work wear pattern on the lap plate, eliminating the need for any manual checking and adjustment. *Booth 420.*

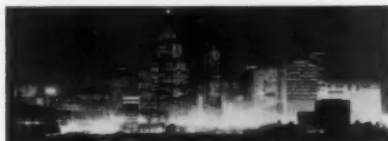
Circle 247 on postcard for more data

New Lapmaster was designed for compact work areas and a large work table surrounds the plate to facilitate loading and unloading. This machine will handle all shapes or forms of parts and is efficient on: monel, steel, tool steel, bronze, aluminum, cast iron, stainless steel and other various metals. All these can be lapped to microinch finishes. Crane Packing Co., Lapmaster Div.



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Toolmaking Machine

The Producto Machine Company will demonstrate a toolmaking machine, designated Roto-Recipro model F-4, in their booth. A main feature of this machine is its ability to simultaneously rotate and reciprocate cutting tools. Thus, in addition to conventional machining methods, this unit performs a new stylus machining technique which uses templates to duplicate irregular and contoured die, punch or piece part shapes.

A deep frame throat enables this machine to accomplish machining operations to the center of a 22 in. circle. *Booth 1144*

Circle 249 on postcard for more data

Production Equipment

Custom designed, multiple-spindle assembly equipment will be on display in the section provided for the Cleco Air Tools Division of the Reed Roller Bit Company.

This unit, designed to assemble all venturi jets in a four-barrel carburetor body, is self-contained and automatically cycled after operator momentarily depresses thumb valves. Unit lowers to work, finder plate contacts carburetor body and spindles run screws down to stall torque at which time motors stop. After two-second pause, unit raises, ready for next assembly. *Booth 526.*

Circle 250 on postcard for more data

Automatic Screwdriver

An automatic screwdriving system will be shown at the show by the Clyde Engineering and Manufacturing Corporation. This unit will handle screws with standard head, Phillips head, automobile body screws, valve body screws and many other types. Automation and semi-automation operations are possible with this line of automatic screwdrivers. *Booth 2221*

Circle 251 on postcard for more data

Hardness Testing

Wilson's new and compact Rockwell Hardness Tester has been designed for measuring the hardness of metals and materials in both the standard Rockwell B and Rockwell C scales. This efficient instrument can be moved from one location to another and eliminates bringing the work to the test station. Here, it is being applied to a heavy casting on the production line. The brackets on this test unit are made from lightweight alloy steels. The actual test operation is performed by employing springs that are naturally and artificially aged. This microhardness tester will be displayed in the area occupied by the Wilson Mechanical Instrument Division, American Chain and Cable Company. *Booth 715.*

Circle 252 on postcard for more data

Recording "Shapes"

The Proficorder is a mechanical-electronic instrument which provides a permanent magnified chart record of the shape, height, and spacing of surface irregularities including long waves, bows, and non-symmetrical profiles, such as steps, plateaus, peaks, and grooves. It shows the profile of practically any machined or finished surface, external or internal. It permits tracing widely varied surfaces at various magnifications.

The Linear Proficorder consists of three basic units: tracer; pilot; and amplicorder. Micrometrical Manufacturing Co. *Booth 305*

Circle 253 on postcard for more data

Special Boring Quills

Special precision boring quills will be displayed at the Briney Manufacturing Company booth, demonstrating a flexibility of design possible with this patented principle of ultra-fine tool adjustment. This principle allows the adjusting of tools as close as 0.0001 in. without moving the tool holding screws. *Booth 1365*

Circle 254 on postcard for more data

Indexing Chassis

Conveyor type indexing unit available with 27, 35, 43, or 51 work carriers. Unit is furnished complete with drive and overload clutch. Indexing takes place during 120 deg of rotation of the cam shaft, while the remaining 240 deg is used for dwell. For a machine requiring more than 240 deg dwell time, special drive and timer can be furnished. Carriers are integral with precision conveyor chain links which position the work to each station accurately.

These highly flexible units are the basis for a wide range of automatic machines using straight line intermittent motion. The completely engineered chassis is delivered ready for applying the tools or assembly devices of your choice. Cam shafts are provided for tool actuation. This unit may be seen at the Standard Tool and Manufacturing Company. *Booth 1838.*

Circle 255 on postcard for more data

Steel Processing

At the forthcoming tool show in Detroit, Firth Sterling, Inc., will present its steel and sintered carbide product lines. Tying in with the show theme of "Tooling for Productivity," Firth Sterling will display high speed steel, tool and die steels, and the Hopkins' process of melting high temperature alloys and tool and die steels for special applications. The carbide division will feature carbide grades for machining and forming, as well as its refractory materials, particularly pure forgeable tungsten, molybdenum, and tungsten-molybdenum alloys. Firth Sterling's exhibits will occupy *Booth 461.*

Circle 256 on postcard for more data

Automatic Inspection

The Cleveland Instrument Company's automatic classifying system consists of the basic gaging, amplifier, and relay components used in automatic part gaging and sorting equipment. It is intended for use by manufacturers of automatic gaging or machine control equipment, or companies who prefer to build their own automation devices. Uses include automatic classification of such items as transistor wafers, balls, gears or other parts according to the variation of a specific dimension. *Booth 634.*

Circle 257 on postcard for more data

MANUFACTURING aspects at the Society of Automotive Engineers' National Production Meeting were largely concerned with several out-of-the-ordinary media. These media included explosive forming, electrochemical milling, cold extrusion, and numerical control.

Held in Cleveland, on March 22-24, the program for two days comprised 12 technical sessions. All of these sessions except one were of the panel type with audience participation, and in every case three were timed concurrently. The third day was devoted to a tour of the Lorain (O.) plant of Ford Div., Ford Motor Co., where assembly of Falcon and Comet automobiles was witnessed.

Other subjects discussed during the technical sessions were Chevrolet's new aluminum foundry at Massena, N. Y., quality control, cutting tools, and metal finishing. Cost reduction—from the standpoints of product evaluation, manufacturing standards, and materials handling—was the overall theme in four of the sessions. Automation in the job shop, heavy-press precision forging, and development of management personnel were additional topics on the varied-subject agenda. At the ensuing banquet the featured speaker was Joseph E. Adams, executive vice-president of The White Motor Co.

Some of the highlights of the meeting are presented in the following:

High-Energy Forming

Explosive metal forming, using black powder or dynamite as the energy source, is practical for low-volume production and makes possible the close-tolerance shaping of "exotic" materials or complex shapes which cannot otherwise be formed. The method, however, cannot compete with conventional techniques where the latter are applicable. It is therefore considered to be an adjunct to, rather than a replacement for, conventional forming methods. These were the overall views of the specialists who participated in the session on this subject.

SAE National Production Meeting

By Charles A. Weinert
EASTERN EDITOR

Tubes as well as sheets can be formed from materials such as molybdenum, titanium, magnesium, columbium, tungsten, tantalum, and beryllium, besides carbon steels, brass, stainless steels, and high-strength alloys of steel and aluminum, among others.

Both open and closed dies are employed, depending upon the configuration of the part piece. Some conventional dies are adaptable to explosive forming in which the lower half of the die only is used. Many of the dies are constructed of Meehanite and Kirksite. Plastic lay-up laminates also have been used in dies for short runs.

The explosive is used in combination with a "ram"—mostly a fluid such as water, but sometimes oil, air, a plastisol type pliable plastic, talcum, mercury, sawdust, or urethane—which is driven at high speed by the explosive charge. Conventional stamping velocities were said to be at the rate of 2 to 5 fps, while explosive velocities range from 100 to 400 fps. With the low explosives (e.g. black powder) the reaction is in milli-seconds at velocities of hundreds of feet per second, to produce 100,000 to 300,000 psi with proper confinement. With the high explosive (e.g. dynamite) the reaction is in a few micro-seconds to produce several million psi. Air is usually evacuated from the space between the workpiece and die, particularly on intricate configurations of parts.

Mention was made of a machine which has been developed for punching holes of 1/4 in. diam minimum, in titanium and in any of the other high-strength materials, using smokeless powder as the explosive media. Another application

of explosive forming is in metal powder compaction. Aside from these, and forming, the process principle is applicable to forging, sizing, extruding, metal hardening, and metal welding.

The physical characteristics of the resulting workpiece are said to be improved in the explosive forming process, including those of any welds made on the piece prior to forming. Also the apparent ductility of the material seems to be increased as much as 70 per cent when explosively formed, with the result that the material can be moved farther with one shot.

Sometimes, for instance on deep draws, multiple shots are employed with annealing in-between. The practice of one fabricator in such cases is to use a heavy shot first and then a light one on the finish operation.

In summary, E. J. White of American Potash & Chemical Corp., chairman of the session, stated these factors were the basic criteria for an explosive forming operation: (1) The type of explosive used is determined by the workpiece; (2) the size of the explosive is critical; (3) the explosive has to be shaped for complex part shapes; (4) the proper media (e.g. water, oil, plastic) for transmitting the pressure must be selected; and (5) selection of the position in which the explosive is placed in relation to the metal, to do the work.

Electro-Chemical Milling

Applications of electro-chemical milling to the processing of aircraft parts was discussed generally by Arthur Watson, Cleveland Pneumatic Tool Co. Basically, the process consists of treating steel parts

(Turn to page 87, please)

• • INDUSTRY STATISTICS • •

By Marcus Ainsworth
STATISTICAL EDITOR

WEEKLY U. S. MOTOR VEHICLE PRODUCTION

As reported by the Automobile Manufacturers Association

| Vehicle Make | Weeks Ending | | Year to Date | |
|---------------------------------|--------------|----------|--------------|-----------|
| | April 2 | March 26 | 1960 | 1959 |
| PASSENGER CAR PRODUCTION | | | | |
| Total—American Motors | 10,961 | 11,179 | 136,048 | 106,405 |
| Chrysler | 1,488 | 992 | 27,851 | 20,068 |
| De Soto | 154 | 87 | 12,800 | 16,063 |
| Dodge | 9,613 | 9,405 | 113,242 | 45,129 |
| Imperial | 322 | 243 | 5,943 | 6,386 |
| Plymouth | 5,057 | 2,468 | 90,699 | 104,244 |
| Valiant | 7,164 | 6,903 | 72,975 | |
| Total—Chrysler Corp. | 23,798 | 20,118 | 323,510 | 191,890 |
| Cornet | 3,852 | 3,479 | 18,775 | 14,275* |
| Falcon | 11,216 | 10,509 | 129,685 | |
| Ford | 22,917 | 12,937 | 337,013 | 419,409 |
| Lincoln | 405 | 403 | 7,615 | 9,312 |
| Mercury | 3,899 | 3,238 | 55,804 | 46,351 |
| Total—Ford Motor Co. | 42,119 | 30,566 | 548,892 | 469,347 |
| Buick | 5,230 | 5,590 | 90,343 | 90,303 |
| Cadillac | 3,391 | 3,381 | 50,807 | 49,156 |
| Chevrolet | 35,784 | 41,598 | 507,390 | 461,464 |
| Corvair | 5,012 | 6,394 | 84,987 | |
| Oldsmobile | 7,772 | 6,805 | 117,403 | 120,699 |
| Pontiac | 11,119 | 9,638 | 129,923 | 121,710 |
| Total—General Motors Corp. | 68,308 | 73,607 | 990,853 | 842,341 |
| Total—Studebaker-Packard Corp. | 2,589 | 1,960 | 34,606 | 52,515 |
| Checker Cab | 202 | 200 | 1,799 | 1,498 |
| Total—Passenger Cars | 147,977 | 137,850 | 2,035,708 | 1,683,906 |
| TRUCK AND BUS PRODUCTION | | | | |
| Chevrolet | 10,095 | 9,900 | 137,945 | 105,963 |
| G. M. C. | 2,584 | 2,643 | 32,618 | 23,909 |
| Diamond T | 57 | 60 | 818 | 1,823 |
| Divco | 100 | 100 | 1,140 | 964 |
| Dodge and Fargo | 1,449 | 1,417 | 23,245 | 23,480 |
| Ford | 8,388 | 8,070 | 105,596 | 86,685 |
| F. W. D. | 23 | 28 | 327 | 274 |
| International | 2,656 | 2,610 | 37,496 | 34,621 |
| Mack | 319 | 294 | 3,668 | 4,589 |
| Studebaker | 569 | 245 | 2,982 | 4,346 |
| White | 412 | 399 | 5,038 | 4,913 |
| Willys | 2,534 | 2,511 | 33,719 | 30,920 |
| Other Trucks | 85 | 85 | 1,045 | 958 |
| Total—Trucks | 29,271 | 28,362 | 385,627 | 323,845 |
| Buses | 45 | 60 | 955 | 578 |
| Total—Motor Vehicles | 177,293 | 166,872 | 2,422,290 | 2,008,419 |

* Edsel production.

1960 TRUCK TRAILER SHIPMENTS

Industry Division, Bureau of the Census

| Type of Trailer | January | December |
|--------------------------------------|---------|----------|
| | 1960 | 1959 |
| Vans | | |
| Insulated and refrigerated | 647 | 555 |
| Steel | 53 | 54 |
| Aluminum | 594 | 501 |
| Furniture | 136 | 83 |
| Steel | 122 | 77 |
| Aluminum | 14 | 6 |
| All other closed-top | 2,797 | 2,982 |
| Steel | 659 | 775 |
| Aluminum | 2,138 | 2,207 |
| Open-top | 314 | 291 |
| Steel | 89 | 89 |
| Aluminum | 225 | 202 |
| Total—Vans | 3,894 | 3,911 |
| Tanks | | |
| Non-and low-pressure | | |
| Petroleum | | |
| Carbon and alloy steel | 161 | 230 |
| Stainless steel | 21 | 28 |
| Aluminum | 153 | 177 |
| Total—Petroleum | 335 | 435 |
| Chemical, food, sanitary | 44 | 44 |
| Dry materials | 53 | 50 |
| High-pressure (LPG, chemicals, etc.) | 32 | 30 |
| Total—Tanks | 464 | 559 |
| Pole and logging | | |
| Single axle | 34 | 17 |
| Tandem axle | 69 | 44 |
| Total | 103 | 61 |
| Platforms | | |
| Racks, livestock, stake | 23 | 30 |
| Grain bodies, all types | 163 | 147 |
| Flats, all types | 761 | 630 |
| Total—Platforms | 947 | 807 |
| Low-bed heavy haulers | 148 | 155 |
| Dump trailers | 94 | 85 |
| All other trailers | 278 | 266 |
| Total—Complete Trailers | 5,928 | 5,944 |
| Dump trailer chassis ¹ | 81 | |
| Trailer chassis ¹ | 226 | 200 |
| Detachable van bodies ¹ | 281 | 388 |

¹ Sold separately.

NEW PASSENGER CAR REGISTRATIONS BY REGIONS

| Zone | Region | Per Cent Change | |
|---------------------|--------------------|-----------------|--------------|
| | | January 1960 | January 1959 |
| 1 | New England | 20,278 | 18,994 |
| 2 | Middle Atlantic | 72,707 | 74,025 |
| 3 | South Atlantic | 65,882 | 55,871 |
| 4 | East North Central | 114,445 | 98,282 |
| 5 | East South Central | 18,811 | 23,396 |
| 6 | West North Central | 32,588 | 35,479 |
| 7 | West South Central | 38,068 | 42,372 |
| 8 | Mountain | 18,852 | 18,310 |
| 9 | Pacific | 53,487 | 62,871 |
| Total—United States | | 430,116 | 429,500* |

States comprising the various regions are: Zone 1—Conn., Me., Mass., N. H., R. I., Vt. Zone 2—N. J., N. Y., Pa. Zone 3—Del., D. C., Fla., Ga., Md., N. C., S. C., Va., W. Va. Zone 4—Ill., Ind., Mich., Ohio, Wis. Zone 5—Ala., Ky., Miss., Tenn. Zone 6—Iowa, Kan., Minn., Mo., Neb., N. D., S. D. Zone 7—Ark., La., Okla., Tex. Zone 8—Ariz., Colo., Ida., Mont., Nev., N. M., Utah, Wyo. Zone 9—Alas., Cal., H. I., Ore., Wash.

* Does not include Hawaii.

Source: Based on data from R. L. Polk & Co. All rights reserved and re-use prohibited.

1960 TRUCK FACTORY SALES BY G. V. W.

As reported by the Automobile Manufacturers Association

| Month | 6,000 lb. and less | 6,001-10,000 lb. | 10,001-14,000 lb. | 14,001-16,000 lb. | 16,001-19,500 lb. | 19,501-28,000 lb. | 28,001-33,000 lb. | Over 33,000 lb. | Total |
|-----------------------|--------------------|------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-----------------|---------|
| January | 82,211 | 17,920 | 1,280 | 3,060 | 18,877 | 5,962 | 3,148 | 2,810 | 116,268 |
| February | 70,248 | 18,989 | 1,222 | 2,985 | 18,348 | 7,023 | 3,896 | 3,530 | 125,938 |
| Total—Two Months—1960 | 152,459 | 36,909 | 2,502 | 6,045 | 37,225 | 12,985 | 7,044 | 6,340 | 241,206 |
| Total—Two Months—1959 | 101,375 | 32,085 | 2,504 | 16,838 | 21,405 | 9,896 | 6,138 | 5,776 | 196,017 |

IMPERIAL

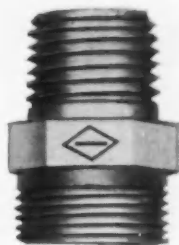
Engineering and Data File



ENGINEERED TUBE FITTINGS — VALVES — TUBING TOOLS

Comparative Vibration Test Results

| NUMBER OF VIBRATIONS IN CYCLES | | | | | |
|---|---------|---------|---------|---------|------------|
| 100,000 | 200,000 | 300,000 | 400,000 | 500,000 | 1,000,000 |
| | | | | | 20,000,000 |
| Flare Fitting failed after 72,450 cycles | | | | | |
| Compression Fitting failed after 79,350 cycles | | | | | |
| FLEX FITTING showed no signs of failure after ... 21,424,500 cycles | | | | | |



Flex tube fittings withstand over 20-million cycles of vibration without failure

To cope with major vibration in fuel, oil, and vacuum lines serving cars, buses, tractors, trucks, and power units — nonrigid tube connections are preferred. Imperial Flex tube fittings have been proven to withstand over 20-million cycles of vibration without failure! (See bar graph above.)

Such top operating dependability is but one of the money-saving advantages of Imperial Flex fittings. These fittings also eliminate costly flexible hose lines except where there is extensive tube movement.

Design engineers point out that tube failure is caused by fracture due to metal fatigue and crystallization — a result of constant shock and vibration. Another cause for failure is tube distortion in making the connection.

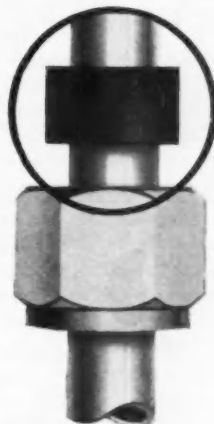
ELASTIC SLEEVE — To overcome these and other rigid fitting joint handicaps,

Imperial designed an elastic sleeve to cushion and absorb vibration. This special synthetic sleeve permits the tube to flex back and forth while continuing to maintain a positive, pressure-tight seal.

These reliable Flex fittings can be used for connecting all types of seamed and seamless metal tubing: copper, aluminum, thin-wall steel (such as Bundy or GM), Monel, stainless steel, Everdur and many others.

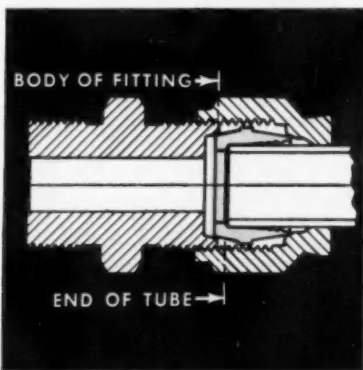
EASY INSTALLATION — To install Imperial Flex fittings for tubing $\frac{1}{2}$ " O.D. or smaller, just slip nut and flex sleeve over tubing. Insert tubing in fitting body as far as it will go and assemble. Positive stop nut prevents over-tightening.

Write for Catalog No. 344



No metal-to-metal contact with Imperial Flex fittings! Husky, resilient sleeve (encircled) withstands gas and oil . . . flexes perfectly in sub-zero to 250° F. temperatures. For $\frac{1}{8}$ " to $\frac{3}{8}$ " O.D. tubing.

Imperial Hi-Seal tube fitting design offers greater reliability, simplifies installation of hydraulic systems



Butt-joint simplifies installation. Tube doesn't enter body of fitting. It bottoms on shoulder of sleeve. No tube torquing when making joint.

Users have obtained these benefits: (1) cuts space requirements up to 50%; (2) reduces number of bends required; (3) cuts man-hours and installation time; (4) substantially reduces the amount of tubing needed.

With Hi-Seal, the tube *does not* enter body of the fitting — it bottoms on shoulder of the sleeve. No need to spring tubing. Closer tube bends are possible — no flaring or threading is necessary. These dependable joints stay pressure-tight beyond the burst strength of the tubing itself!

Shipped fully assembled, Hi-Seal tube fittings are available in brass, steel and stainless steel, for $\frac{1}{8}$ " to $1\frac{1}{2}$ " O.D. tubing. Long dryseal pipe threads are provided on all pipe ends.

Write for Bulletin No. 3061



Hi-Seal conforms to J.I.C., A.S.M.E. and A.S.A. standards.

CONTACT YOUR IMPERIAL REPRESENTATIVE OR WRITE TO:

THE IMPERIAL BRASS MFG. CO.
Dept. AI-40, 6300 W. Howard St.
Chicago 48, Ill.

Please rush me:

Bulletins ☐ No. 344 ☐ No. 3061

Name

Title

Company

Street

City

Zone ... State

IMPERIAL

THE IMPERIAL BRASS MFG. CO.
6300 W. Howard St., Chicago 48, Illinois
In Canada: 18 Hook Ave., Toronto, Ontario



News of the MACHINERY INDUSTRIES

By Charles A. Weinert

Machine Tool Sales Improve in February

Sparked by a heavier-than-usual influx of metal-cutting-machine orders from abroad, machine tool sales during the month of February hit the fairly sizable volume of about \$60.8 million net.

Broken down, the preliminary figures indicate that net new orders for metal-cutting machines amounted to \$48.4 million — of which \$36.2 was in domestic orders and \$12.2 million in foreign orders — and that net new orders for forming-type machines totaled \$12.4 million. Foreign orders for forming-type machines had a volume of \$1.75 million net, while domestic forming-machine orders were valued at \$10.65 million net.

It will thus be seen that February's foreign orders for both types of machines amounted to \$13.95 million; while domestic orders for both machine types totaled \$46.85 million.

By comparison, January's net new orders, as finally determined, amounted to \$43.45 million metal-cutting and \$13 million forming-type, for a total of \$56.45 million. Foreign orders in January totaled \$11.4 million net.

Insofar as metal-cutting machines only are concerned, foreign orders in February at \$12.2 million compares with an average 1959 monthly volume of about \$5.6 million. Foreign metal-cutting orders both in December and in January, however, were in the \$9 million bracket.

Incidentally, the February 1960 total order figure of \$60.8 million, compares with a volume of \$45.4 million for February 1959—and an

average monthly value during 2nd Half 1959 for both types of machines of close to \$59 million.

On shipments, the preliminary volumes for February 1960 were \$40.3 million metal-cutting and \$11.8 million forming-type machines, for a total of \$52.1 million. In January the combined total was \$46.4 million; while in February a year ago it was \$36.05 million.

These latest operating statistics

Machine Tool Sales in February, With a Net Volume of About \$60.8 Million, Exceeded Both January 1960 Orders and the Average Monthly Volume for 2nd Half 1959

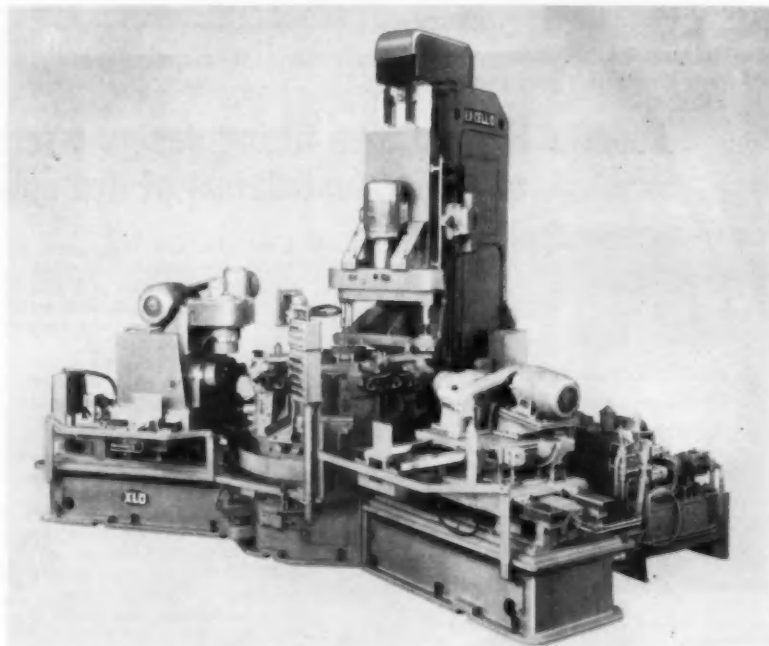
of the industry were compiled by the National Machine Tool Builders' Association.

NMTBA to Discuss Standards, Exposition

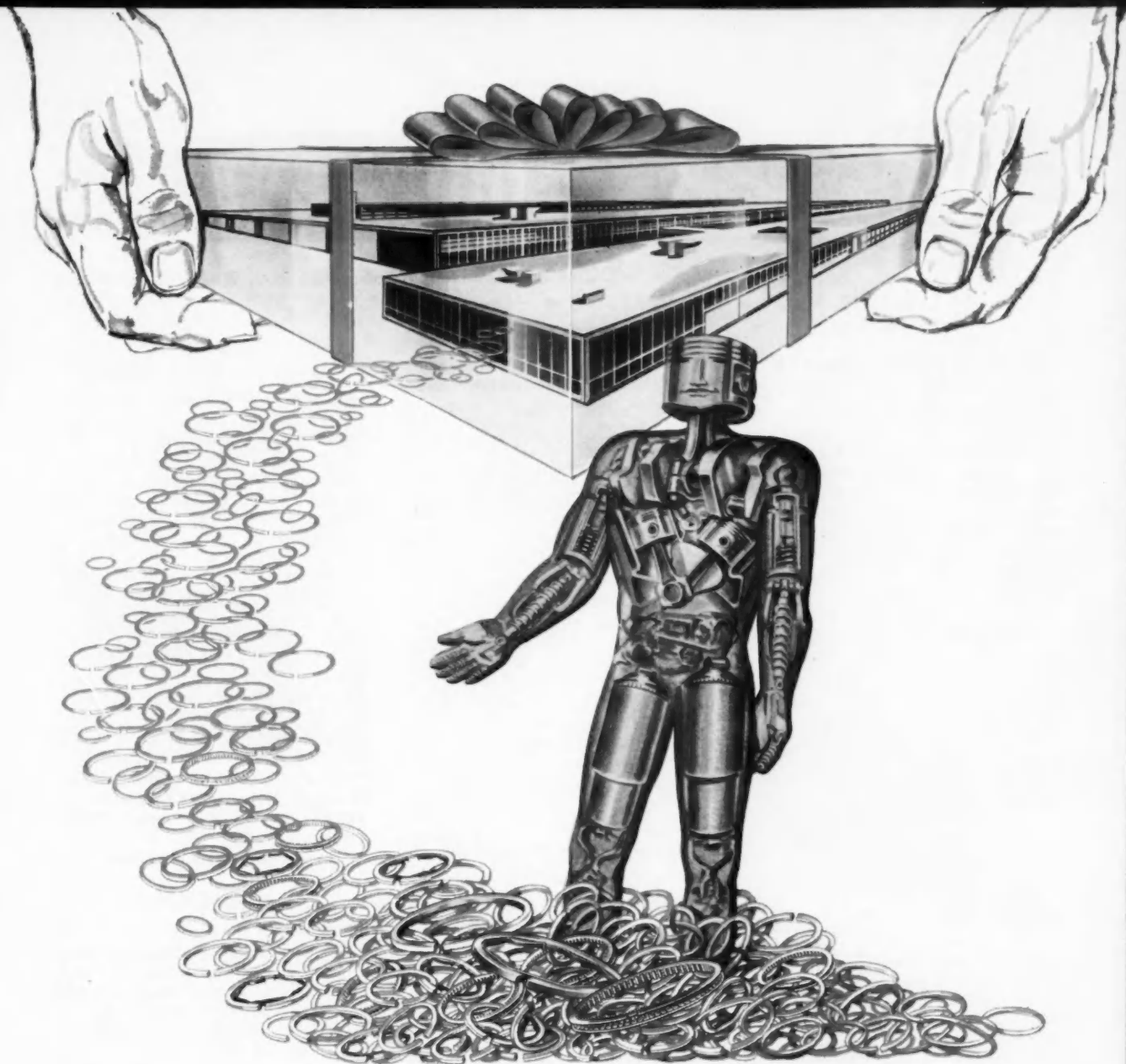
May 5-6 at the Roosevelt Hotel in New York City are the dates and place for the forthcoming 58th Spring Meeting of the National Machine Tool Builders' Association.

(Turn to page 124, please)

Machine Does Multi Operations on Truck Manifolds



Built recently by Ex-Cell-O Corp. for a truck manufacturer, this rotary index machine, in one automatic cycle, rough and finish mills three joint face pads and drills nine mounting-bolt holes in processing exhaust manifold castings. It also core drills with a special drill designed by Continental Tool Works that bores to a predetermined depth and then chamfers the bottom of the hole. Gross machine output, with a 27-sec cycle, is 133 manifolds per hour.



give the gentleman what he wants...

CAPACITY...
the complete
package

CAPACITY to keep the GENTLEMAN knee deep in OEM piston rings...if he wants them that fast! CAPACITY to manufacture the new ring designs that are constantly coming off the boards. *Capacity* to create the new machinery so essential to the manufacture of these new rings...at higher speeds, greater precision, lower costs. Yes, that is the kind of Capacity that we have at THOMPSON PRODUCTS RAMCO...the kind we know will GIVE THE GENTLEMAN WHAT HE WANTS...

Right now...most car factories and engine builders have T. P. RAMCO rings on test. May we tell you more about T. P. RAMCO Capacity? New Ring Designs? We'd like to very much.

Piston Rings by THOMPSON PRODUCTS RAMCO DIVISION



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LIGHT METALS
DIVISION

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NEW

PRODUCTION and PLANT

EQUIPMENT

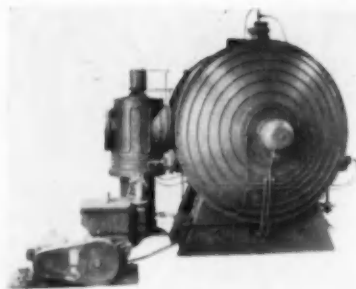
FOR ADDITIONAL INFORMATION, please use reply card at back of issue

By C. J. Kelly
ASSISTANT EDITOR

Heat Treating Furnace

AN automatic high vacuum cold wall type furnace features a work space 26 in. wide, 26 in. deep, and 24 in. high, and a 200 lb capacity. The general purpose vacuum heat treating unit will be used for high temperature copper brazing and heat treating of gas turbine parts and assemblies. This unit can be used for hardening, tempering, drawing and annealing refractory metals, stainless and special alloy steels.

The furnace, series V-5-750, has an operating temperature of 2600 deg F.,



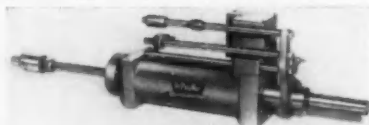
a maximum operating pressure of 0.1 micron Hg, and takes a power supply of 150 kw/hr. It has a transformer built in for operating 110V control circuits. Total floor space required is 10 ft 10 in. by 13 ft 10½ in. which includes the furnace, the vacuum system, control panel and power panel. The furnace is charged horizontally and has a molybdenum hearth. The charging door is side hinged and is equipped with a sight glass for viewing the work during heating. The pumping system consists of a 120 cfm mechanical pump and a 16 in. diameter vapor diffusion pump capable of a pump down time from atmosphere to 1 micron Hg in less than 20 minutes. *Ipsen Industries, Inc.*

Circle 35 on postcard for more data

Checking Cylinder

A NEW checking cylinder, known as the model HB-125, is designed for mounting on the base, side or nose

of various types of tools and cylinders. This device is a self-contained, pull type hydraulic cylinder. It

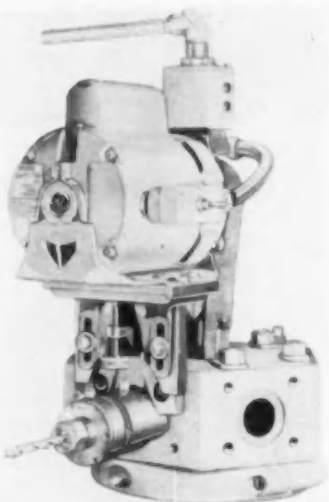


has stroke lengths of 3½ to 12 in., with a checking load of 1200 lb. It was developed to provide an external hydraulic feed rate to the different tools and cylinders it is employed on. In its use, this device is mounted adjacent to or in line with the object it is to function with. A cam, attached to the tool or cylinder, provides the pull force necessary to operate the Hydra-Brake-125. *Hy-PneuMat Inc.*

Circle 36 on postcard for more data

Turret Lathe Attachment

A NEW deep hole drilling attachment has been designed to fit some models of Warner Swasey, Gisholt and Jones & Lamson turret

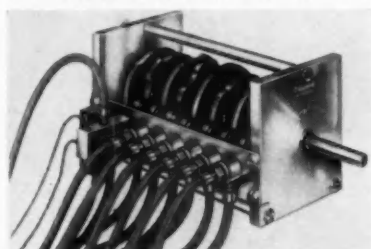


lathes. It is powered by a ¼ hp motor, is capable of 1725 rpm, and by use of a timing belt speeds of 1150, 1725, 2490 and 3740 rpm are available. *Boyar-Schultz Corp.*

Circle 37 on postcard for more data

Sequence Programmer

A NEW compact pneumatic-electrical programming unit has been designed for precise control of automatic tooling and work operations. The end plates are drilled and tapped to allow variable mounting on the side or bottom. The overall size of this device is 7½ by 3½ by 4 in.

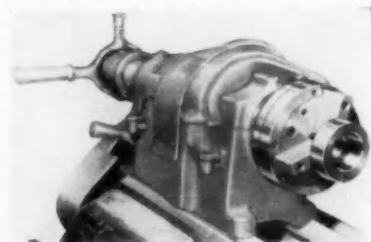


A steel shaft may be extended out either or both ends for tandem operations. *Clippard Instrument Laboratory, Inc.*

Circle 38 on postcard for more data

Precision Chuck

DESIGNATED the model 1000, a new 5 in. precision chuck has been developed for application on high speed lathes, boring machines and grinders. This unit is supplied with blank top jaws, which are designed to be bored out to fit the workpiece. Diameters up to 3½ in. can be held



on the ID or OD, and accuracy is claimed to less than 0.0005 in. A ¼ in. hole is provided in the chuck to allow coolant to be piped through the spindle.

This device is equipped to handle chuck or collet jobs. The face of the chuck extends to 1½ in. beyond the end of the spindle, and overall weight is 8½ lb. *PowerGrip, Inc.*

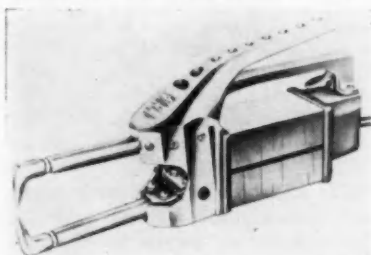
Circle 39 on postcard for more data

AUTOMOTIVE INDUSTRIES, April 15, 1960

Portable Spot Welders

Two new portable spot welders for use on mild steel, stainless steel, and galvanized iron up to 1/4 in. combined thickness have been announced.

Of rugged construction, the completely portable units weigh 24 pounds. Model 11 operates from 115 volts AC and requires 3.3 KVA.



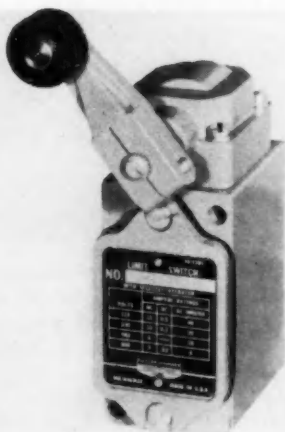
Model 23 requires 230-volt AC power and is rated at 4.4 KVA. The design features a fixed top tong which permits one-hand operation of the unit relieving the other to position the work. The top tong rests the weight of the unit on the exact spot to be welded, giving added contact pressure for a sound weld and reducing operator fatigue. In operation, the tip of the top tong is placed on the spot to be welded, the handle is squeezed, and the switch trigger raised. Weld timing varies with contact, thickness, and type of metal.

Metal & Thermit Corp.

Circle 40 on postcard for more data

Sealed Limit Switch

A NEW line of limit switches has been manufactured and specifically designed for applications on high-speed, precision production machines,



the C-H limit switches are oil-tight and ideal for installations where high impacts and adverse environmental conditions are recognized as major

switch selection factors.

Each switch is sealed to positively check seepage of oil, coolants, moisture and abrasive grit. External seals are located at the operating shaft bearing and between the cover plate and contact assembly. An internal seal between the operating head and switch base provides double insurance

against the entrance of liquids into the contact cavity.

Another exclusive in the design is enclosed but visible contacts. This added bonus is achieved through the use of a new thermoplastic material which guarantees positive contact visibility. *Cutler-Hammer Inc.*

Circle 41 on postcard for more data

Horizontal Boring, Drilling and Milling Machine

COMPLETE pendant control of every machine function, "joy-stick" control of milling feeds, a three-way column, and a motorized headstock are among the production-boosting features of a new 6 in. spindle table-type horizontal boring, drilling, and milling machine.

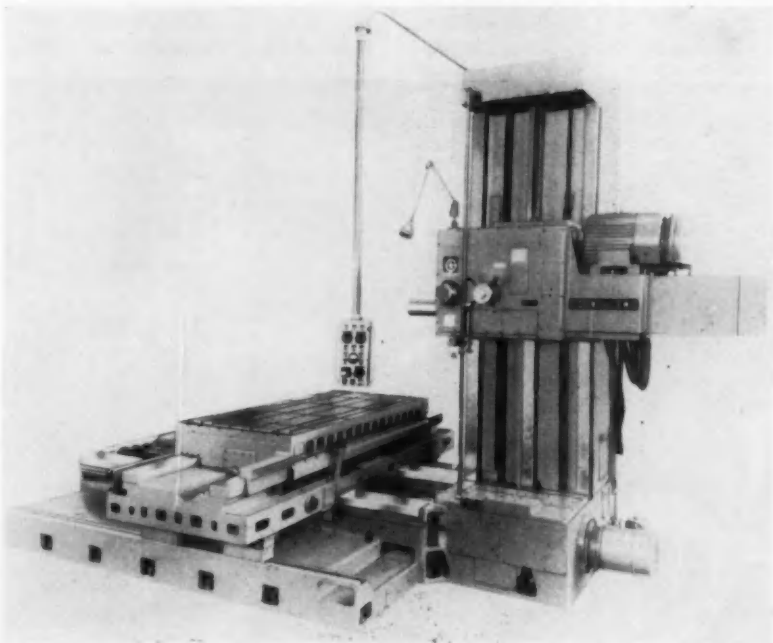
Designed and powered as a 6 in. spindle machine with a 30 or more horsepower main drive motor, it also is available as a 5 in. spindle machine in a size, weight, and price range said to be competitive to other 5 in. machines.

The pendant provides the operator with remote control of headstock, spindle, table, and saddle, including start, stop, direction, traverse, feed, speed, and clamping. Independent saddle and spindle feeds, as well as combination saddle and spindle feed for smooth, uninterrupted machining of long bores are provided. Head, table, and saddle milling feeds can

be operated independently or in any combination. Clamping of head, table, saddle, and spindle is by electrohydraulic mechanisms. Spindle feeds and speeds may be preselected while the spindle is running.

The spindle itself is carried in a hardened sleeve rotating on Timken 0-33 tapered roller bearings. Surface finish on the spindles is reported to average between two and three micro-inches with runout normally measuring but 0.0001 to 0.0002 TIR.

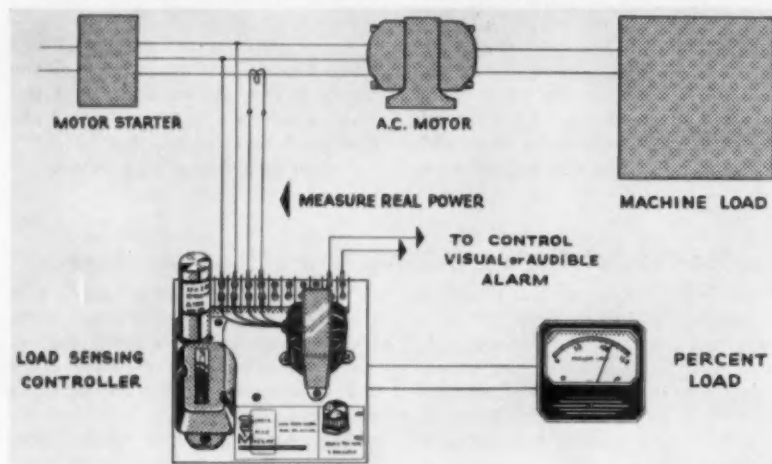
Several types of table and saddle arrangements are available to meet requirements. These include two-way bed, two-way bed with in-the-floor supports, four-way bed, and four-way bed with in-the-floor or over-the-floor supports. Antifriction roller bearing saddle supports ride on hardened steel strips. Twenty-four lines of contact rather than the normal two are provided by each support. *Giddings and Lewis Machine Tool Co.*



New machine designed for future application of automated controlling

Circle 42 on postcard for more data

Control Measures "Real" Load on a Drive Motor



A new motor load-controller that senses load in kilowatts is available for use with any machines that use ac induction motors for driving power. The instrument will operate with single or three phase systems at 110, 220, or 440. It senses both voltage and current and measures the phase angle between them. Seneca Falls Machine Co.

Circle 43 on postcard for more data

Manifold Machining Accomplished During Transfer

EXHAUST manifold castings can be completely finished in a machine designed to allow for alterations in design. Another feature is a saving in floor space when this unit is utilized.

A two-position fixture, mounted on the shuttle, is loaded with two parts in the first station. One raw casting is clamped with the four exhaust port flanges up. A partially finished casting is turned end for end, rotated ap-

proximately 90 deg and clamped with the tailpipe flange up. The fixture locates the unmachined part on cast surfaces and will accommodate normal casting variations. The semi-finished part is located by two milled surfaces and two drilled holes.

After the automatic cycle is initiated, the pallet moves to the second station. During the transfer, the parts pass under and are machined by three inserted-blade carbide-tipped milling

cutters. The exhaust port flanges pass under a roughing and finishing cutter.

In the second station, the tailpipe flange holes of the raw casting are drilled by an angular head. The same holes in the semifinished part are tapped by tools mounted on the same short vertical column as the milling cutters. With normal part design changes, it would only be necessary to change the angle of the tailpipe flange-drilling head. Because of standard component design, this is a comparatively simple matter. Fixturing changes would depend on the angular change.

The parts are shuttled back to the first station in rapid traverse for the final machining operations. To prevent scuffing of the milled surfaces, the milling cutters are lifted about 1/8 in. during the period of the return movement.

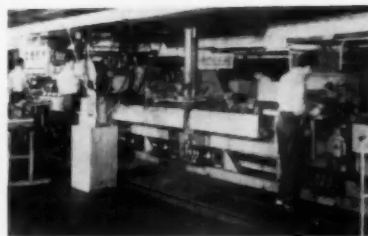
In this station, the eight exhaust port flange holes of the raw casting are drilled and the central opening in the tailpipe flange of the semifinished part is finished with a two-step boring tool using carbide cutters. Cross Co.

Circle 44 on postcard for more data

300 Pumps per Hour

THIS semi-automatic machine is used to produce Vane-Type hydraulic pumps for Chevrolet power steering systems.

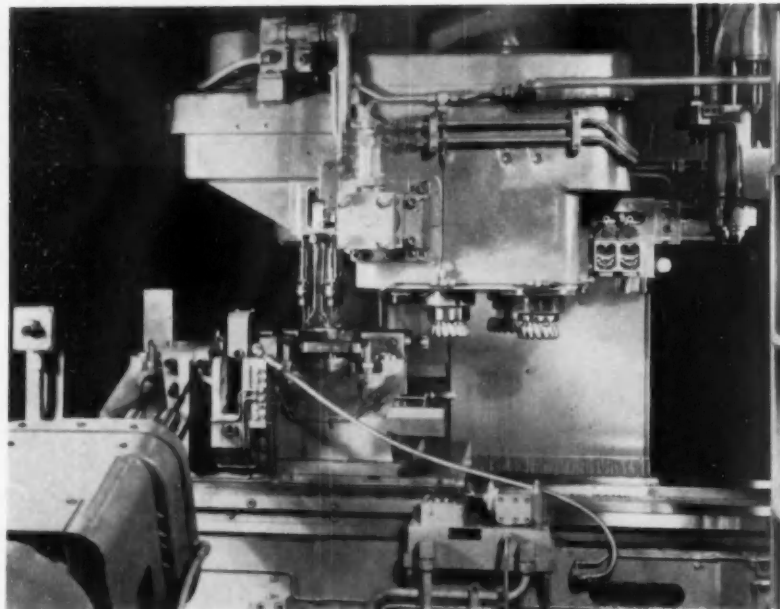
At present, the machine using 11 operators has an output of more than 300 pumps per hour and with minor modifications output could easily be increased an additional 25 pct.



A total of 41 parts is being assembled in a combination of 20 individual operations many of which are completely automatic. Each pump is given a leak and final functional test before it leaves the machine.

This machine is built around a standard "Auto-Tran" straight-line indexing machine chassis supplied by Swanson-Erie Corp. Tooling was applied by the Helfrecht Machine Co.

Circle 45 on postcard for more data



Tailpipe flange changes are accommodated by minor machine and fixture adjustments

SAE National Production Meeting

(Continued from page 79)

electrically in an acid solution which forms an oxide film that dissolves as rapidly as it is formed.

The method is mainly being used to remove decarburized surfaces on aircraft forgings. Removal is at the rate of about 0.012 in. per hour, ending up with tolerances held within ± 0.007 in. and a surface finish of 40 to 60 microinches rms. The process is also being used on some sheet steel parts. It can be employed for purposes of weight reduction, dimensional correction, pocket milling, and perforation of sheet stock, among others. Removal of material can be selective—by masking. Hydrogen embrittlement of steel is not encountered, if the electro-chemical milling is done properly.

The speaker further indicated that while the advantages of the process apply especially to steel, it could also be used on aluminum, copper, and high-copper materials.

Cold Extrusion

Cold extrusion of automotive and missile parts is evidently gaining ground. This fact was made quite apparent during the session in which latest developments along these lines were discussed. Here again, the experts were frank enough to admit that the process will not completely supersede existing methods of manufacture, and that it is basically one more process of accomplishing work. As a matter of fact, Larry Shiller, Norris-Thermador Corp., stated most of its virtues had been obtained in missile work when it was combined with other operations such as coining and pre-shaping.

The method's advantages include increased physical properties from cold working and by improved grain flow; also precise dimensioning and better finish, thus reduced machining requirements and affording savings of material (no chips).

Harold Bogart of Ford Motor Co. described several different regions in which the cold extrusion process has been applied. One of

these applications is a piston pin, which he said had three times the fatigue life of its former equivalent part, with tremendous savings in material. On this piece apparently sizing and holding to tolerance weights have worked out extremely well. Other applications at Ford are truck wheel nuts, engine tappets, universal joint bearing races, a steering gear worm blank, transmission sun gears, and a tractor PTO shaft.

In the opinion of Mr. Bogart, there are some problems which if resolved could expand the use of cold extrusion. He mentioned utilization of existing presses for the work, quick change of dies, and standardization of loading and unloading mechanisms so several different parts could be handled with the same equipment. Also that it was not yet known what occurs in high-speed operations or what advantages might be so derived.

From the part design standpoint, it was recommended that the geometry of parts considered for cold extrusion be designed particularly for extrusion, and also that the die designer be consulted in the early design stages.

With respect to tool materials, the opinion of Mr. Braun of Braun Engineering Corp. was that high-speed steels, as a general rule, make the best punches. He said he believed there was a tendency to make the tools too soft, that most of the damage came from compression rather than from wear, and that M-3 high-speed steel makes a good extrusion tool. He also stated that dies are different, and that for this purpose uniform through-hardening steel could be used at one extreme and carbides at the upper end—in both cases backed up with good compression rings. Basically, he said it was a case of finding the right tool material for every job.

The question was raised as to the advantages between deep drawing and cold extrusion. The answer here was that deep drawing usually requires more passes—therefore a larger number of dies and

more annealing operations—than required with forward extrusion.

Some work has been done with extruding austenitic steels at temperatures of 800 to 1000 F, according to Mr. Bogart of Ford, and in such cases it was felt that the reduction could probably go to 25 per cent. In cold extrusion, Mr. Braun said that 1035 steel was as far as his company had gone on a production basis, but that he believed higher carbon steels could be extruded, particularly when using some of the newer tool steels.

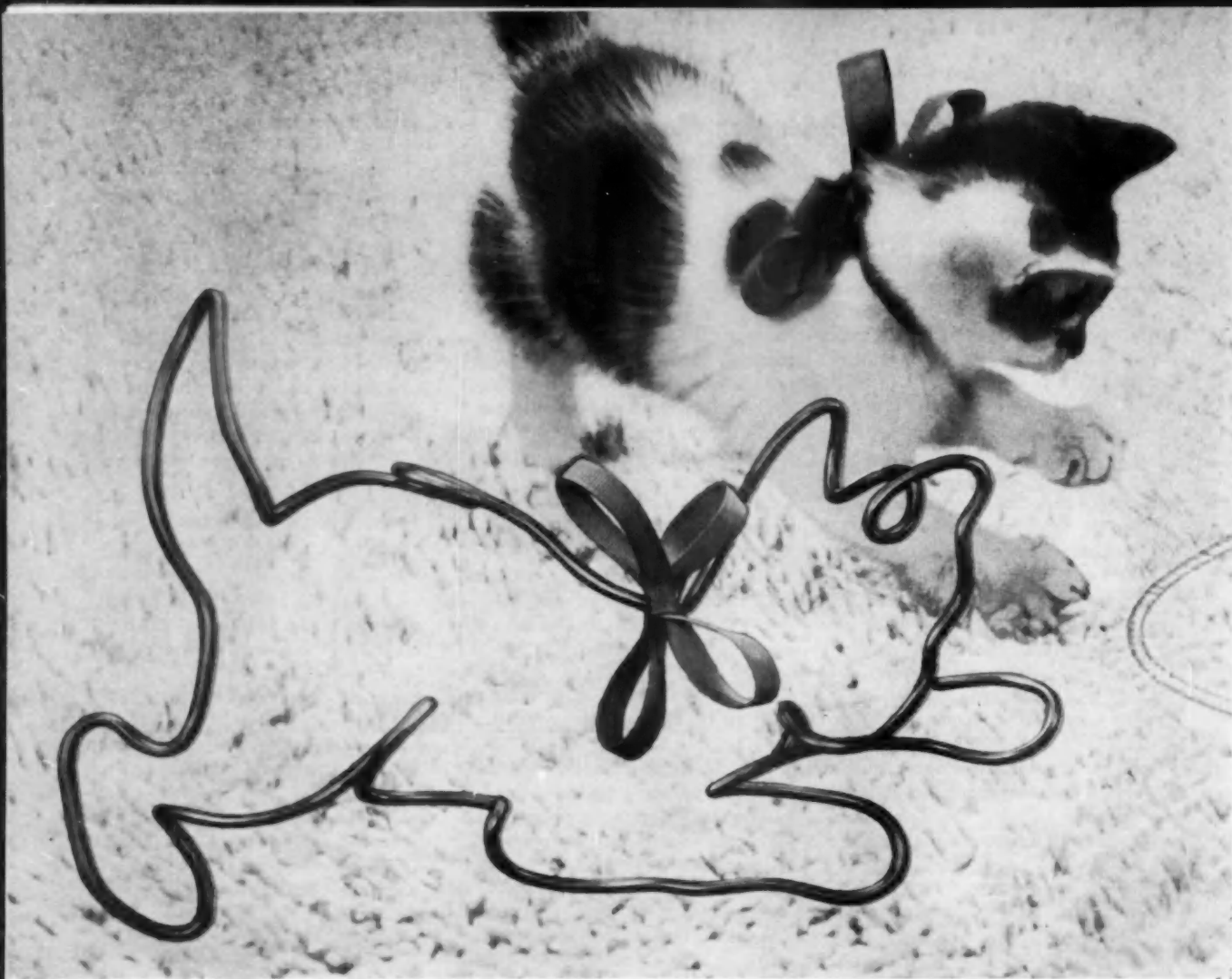
Numerical Control

With some 300 to 500 numerically-controlled machine tools now in the hands of 40 to 50 different manufacturers, this type of equipment has "reached its first plateau of consolidation," P. D. Tilton of Stanford Research Institute said. He reiterated that it doesn't compete with automation and is most suitable where the lot sizes are fairly small. Also that the equipment is expensive, but that its increased productivity with certain types of work makes it economically justified and, in fact, very profitable.

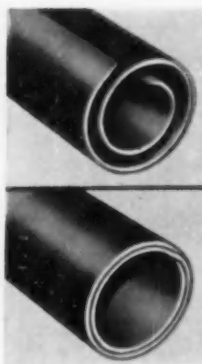
Another speaker predicted a tremendous growth in the sale of numerical-control systems this year. According to his figures, about \$7.5 million had been spent on 655 point-to-point systems through 1959, and about \$7 million on 200-odd contouring systems. For 1960 the estimates are about 970 point-to-point systems worth \$12 million (roughly 50 per cent more than the total through 1959), and about 130 contouring systems worth \$4.5 million—for grand totals of about 1100 machines and \$16.5 million.

J. B. Rankin of Convair Div., General Dynamics Corp., Fort Worth, Texas, explained his company's experience with 11 numerically-controlled machines. He stated these machines were handling more work than all the other machines in this plant. Upon being questioned about downtime, he replied that on the systems with which they had the most experience, and where the maintenance men are familiar with the systems, downtime is in the range of two

(Turn to page 102, please)



There's almost no limit to the things Bundy can mass-fabricate



Bundyweld is the original tubing double-walled from a single copper-plated *steel* strip, metallurgically bonded through 360° of wall contact for amazing strength, versatility.

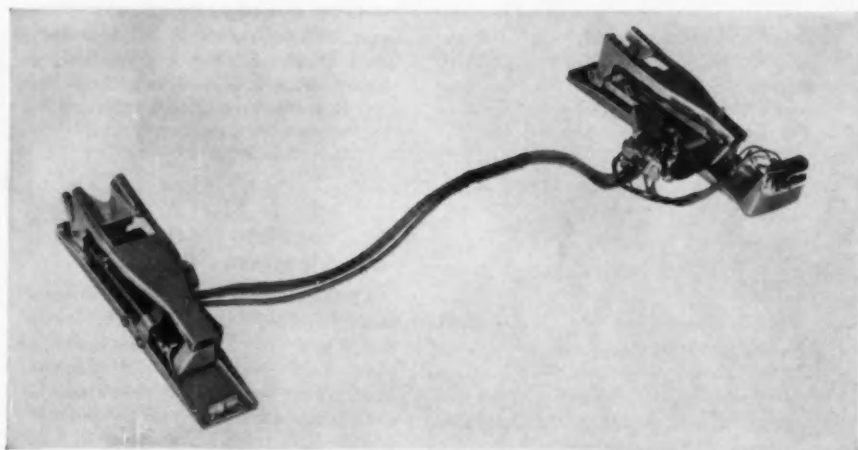
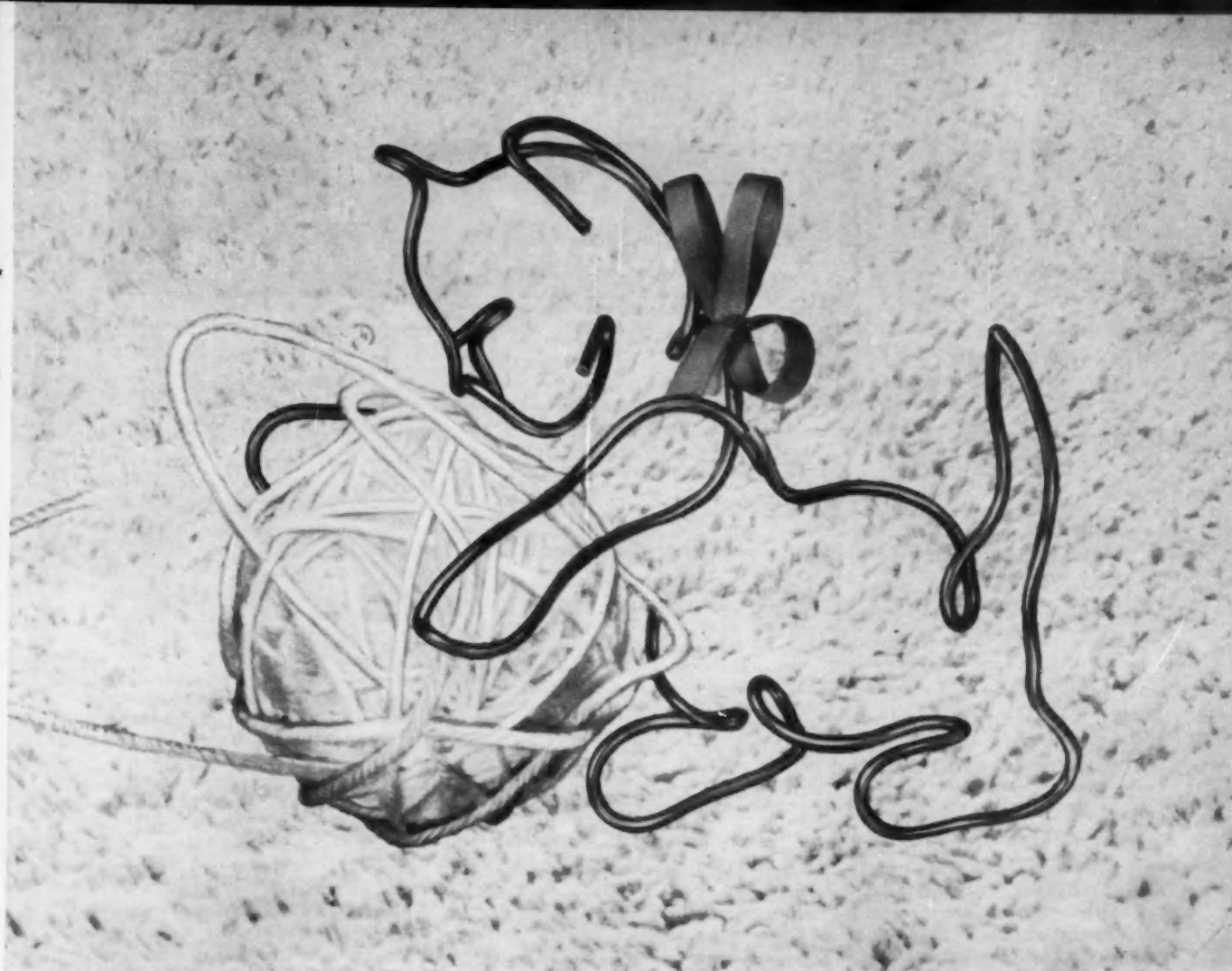
Bundyweld is lightweight, uniformly smooth, easily fabricated. It's remarkably resistant to vibration fatigue; has unusually high bursting strength. Sizes up to 3/4" O.D.

Experience makes the difference! And Bundy engineers, backed by years of experience in designing and fabricating tubing parts, can help you solve your tubing problem.

Bundy engineers will work with you at any time during the development of your product. They may be able to suggest design modifications in your tubing components to cut fabrication costs. Then your design will be turned over to Bundy specialists who will mass-fabricate your tubing parts at low unit cost with Bundyweld.

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Circle 144 on Inquiry Card for more data

NEW

PRODUCTS

AUTOMOTIVE - AVIATION

FOR ADDITIONAL INFORMATION, please use reply card at back of issue

By C. J. Kelly
ASSISTANT EDITOR

New Highway Truck Tire

Highway truck tires have been designed with an 11-row tread. Three main center rows are divided into three rows each by slots, marking the first time a heavy service tire has been slotted continuously around its circumference according to the manufacturer. Tread design gives increased pulling and stopping power and greater protection against sideskidding and jackknifing. A blank branding panel is provided in the sidewall area to permit fleet operators to brand each tire with their own name or code numbers, thus facilitating main-

tenance and keeping of tire service records. *United States Rubber Co.*
Circle 50 on postcard for more data

Nylon Castings

Nylocast is the designation given to a line of castings manufactured from a high viscosity nylon, employing a process developed in Europe. They are reported to be applicable, as machine components, to the various heavy machinery industries. *Nylon Molded Products Corp.*

Circle 51 on postcard for more data

Self Threading Nuts

Spring-tempered steel nuts form their own deep, clean threads while turning on unthreaded studs, rod, wire or pins of die cast zinc; also steel, brass, aluminum, high-impact plastics and other malleable materials. The central opening of the nuts is a double, coarse pitch thread which acts like a die in starting and forming a continuous spiral thread impression while assembling. High tensile and torque valves are provided, while resilient spring forces assure a strong, vibration-proof grip, whether seated or unseated. *The Palmat Co.*

Circle 52 on postcard for more data

New Aluminum Water Pump With Phenolic Impeller

An aluminum body water pump, designed specifically to take advantage of the lightness and properties of die-cast aluminum is shown in a "cut-away" to emphasize the features of design detail. For example, the inlet, seen in the elevation, is so arranged as to provide for tangential flow. This has been found to contribute to an improvement in inlet flow characteristics.

The cross-section shows the general design of the die-cast aluminum body, particular attention being drawn to the inlet cavity configuration. It is

claimed that this results in unusually quiet operation as well as a high flow rate and high capacity for its size. These characteristics add up to improved flow conditions. Moreover, the smoothness of the die-cast surfaces contributes importantly to smoother flow with consequently reduced cavitation effects.

In addition, the molded phenolic impeller is lighter, has less tendency to vibrate, and is designed to contribute to the features of high capacity. *Motor Equipment Mfg. Div., Thompson Ramo Wooldridge, Inc.*

Urethane Foam Filters

Several of the 1960 automobiles are equipped with a filter made from urethane foam that was developed at the *Foam Div. of the Scott Paper Co.*

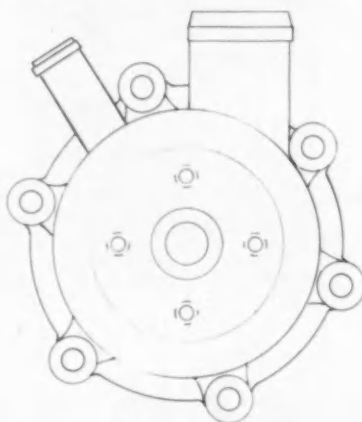
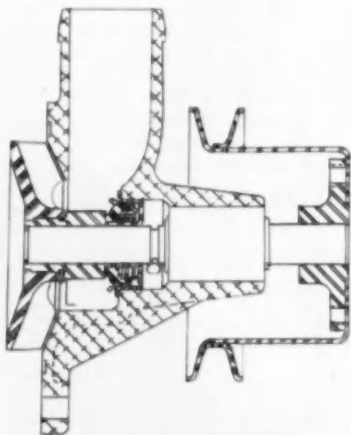
This material has uniform porosity, heat resistance, high strength and elasticity according to the manufacturer. The filter is being manufactured at the *AC Spark Plug Div. of General Motors Corp.* Buick, Corvette, and Corvair are all equipped with the foam carburetor air cleaner filter.

Circle 53 on postcard for more data

Aluminum Bumpers

A chrome plating process, developed especially for automobile bumpers, and a new series of aluminum alloys have been introduced. Production prototypes have been delivered to automobile manufacturers to undergo winter road tests. Consideration was given to the strength, cost completion, beauty, and corrosion resistance in the development of this alloy and plating process. The alloys and plating process were developed at the *Dept. of Metallurgical Research, Kaiser Aluminum and Chemical Corp.*

Circle 55 on postcard for more data

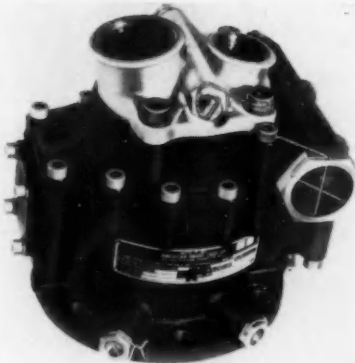


New units designed for application on existing or future passenger car engines
Circle 54 on postcard for more data

Airborne Hydraulic Pump

A new hydraulic pump for aircraft and missiles, known as the AP10V, delivers approximately 27 gpm at 3,750 rpm and 3,000 psi, with a maximum displacement of 1.77 cu in. per revolution. Weight of the pump is 17½ lbs.

The AP10V is a single-stage, variable-volume, cam-actuated pump with



pressure compensator control. Response characteristics meet and exceed those required by MIL-P-7740B and MIL-P-19692. Volumetric efficiency is over 95% through a pressure range up to 3,000 psi.

Several exclusive design features combine to provide dependable performance in an envelope small in size. All rotating parts are hydraulically balanced. The pump does not require either a universal drive or anti-friction type thrust bearings. A direct oil entry arrangement permits greater periods of cavitation without noticeable wear, and top performance is maintained under contamination conditions up to 40 microns. Kellogg Div., American Brake Shoe Co.

Circle 56 on postcard for more data

New Type Propeller

The radial lift force principle of a new propeller will permit vertical take-off and landing and transition to high speed flight. When this development is employed on an aircraft it will have the capabilities of conventional take-off and landing without the use of high lift wings. Even with power off, the windmilling propellers provide lift and gliding for a conventional landing with the specially designed craft.

Built of fiber glass and steel, patents have been issued and are pending for the new design both for the propeller and method of fabrication. De-

signed for infinite life and maximum safety, the propeller has low tip speed, low stress levels and is quiet in operation. Curtiss-Wright Corp.

Circle 57 on postcard for more data

New Aluminum Alloy

A new bright, corrosion resistant aluminum alloy has been developed for industrial applications, and as trim on automobiles. It has a mirror-like brilliance that would be suitable for both interior and exterior automobile and truck trim. Alloy 5657, as it has been designated, is a non-heat treatable metal and it may be formed in all tempers. Reynolds Metals Co.

Circle 58 on postcard for more data

New Microdials

This new series, the 1360, is specially designed to add richness and style to electronic control panels and equipment by means of new, high-style package design, attractive profile and the use of colored plastics in fabrication. Five standard or stock models are available in various combinations of red, gray and black colors. Color variations were scientifically chosen and are known as "dead neutral." This alludes to their ability to be incorporated harmoniously with blues, greens or any other colors.



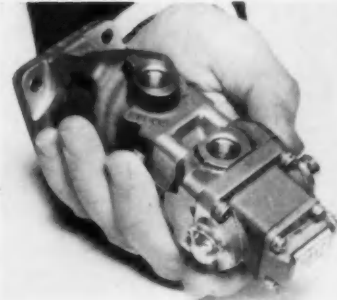
Numbers and gradations are molded in depth. Colors are inlays of colored plastic which can never wear, scale or rub off. Contoured brake arms lock settings in place, but do not interfere with reading or setting. Borg Equipment Div., Amphenol-Borg Electronics Corp.

Circle 59 on postcard for more data

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KEEPS YOU INFORMED**

Valve-Motor Package

A servo valve-hydraulic motor package is used to control, accurately, velocity and position of radar drives, missile guide vanes, gun turret drives, reels, winches, hoists, flight controls, stabilization devices and other aircraft, missile and ground support applications. The servo valve modulates flow to the motor producing speeds



proportional to electrical input signals.

The miniaturized servo valve weighs only 0.53 lb., which holds the valve-motor package size and weight to a minimum dry package weight of 2.7 lb. The entire valve-motor unit occupies approximately 60 cu in. of space. Models with integral relief valves weigh 2.9 lb. with no sacrifice of additional length.

The package is designed to cover any speed range between 10 to 20,000 rpm with a maximum output running torque of approximately 30 lb in. at 3000 psi supply pressure. Vickers Inc., Div. of Sperry Rand Corp.

Circle 60 on postcard for more data

Micro-Wire Welding

MICRO-WIRE welding is a new automatic welding process developed for carbon dioxide shielded arc welding or mild steel from 24 gauge to ¼ in. thickness.

The process was named for the small 0.020 to 0.045 diameter welding wire (comparable to the diameter of a pin or paper clip) that is fed continuously from a spool into the weld zone. Equipment for the process includes a lightweight gun-cable assembly, a wire feed unit, gas supply and regulation apparatus, and a power source of the constant voltage or variable slope type. For some applications, additional arc stabilizers are added to the welding circuit to improve the welding characteristics of the power supply. Hobart Brothers Co.

Circle 61 on postcard for more data



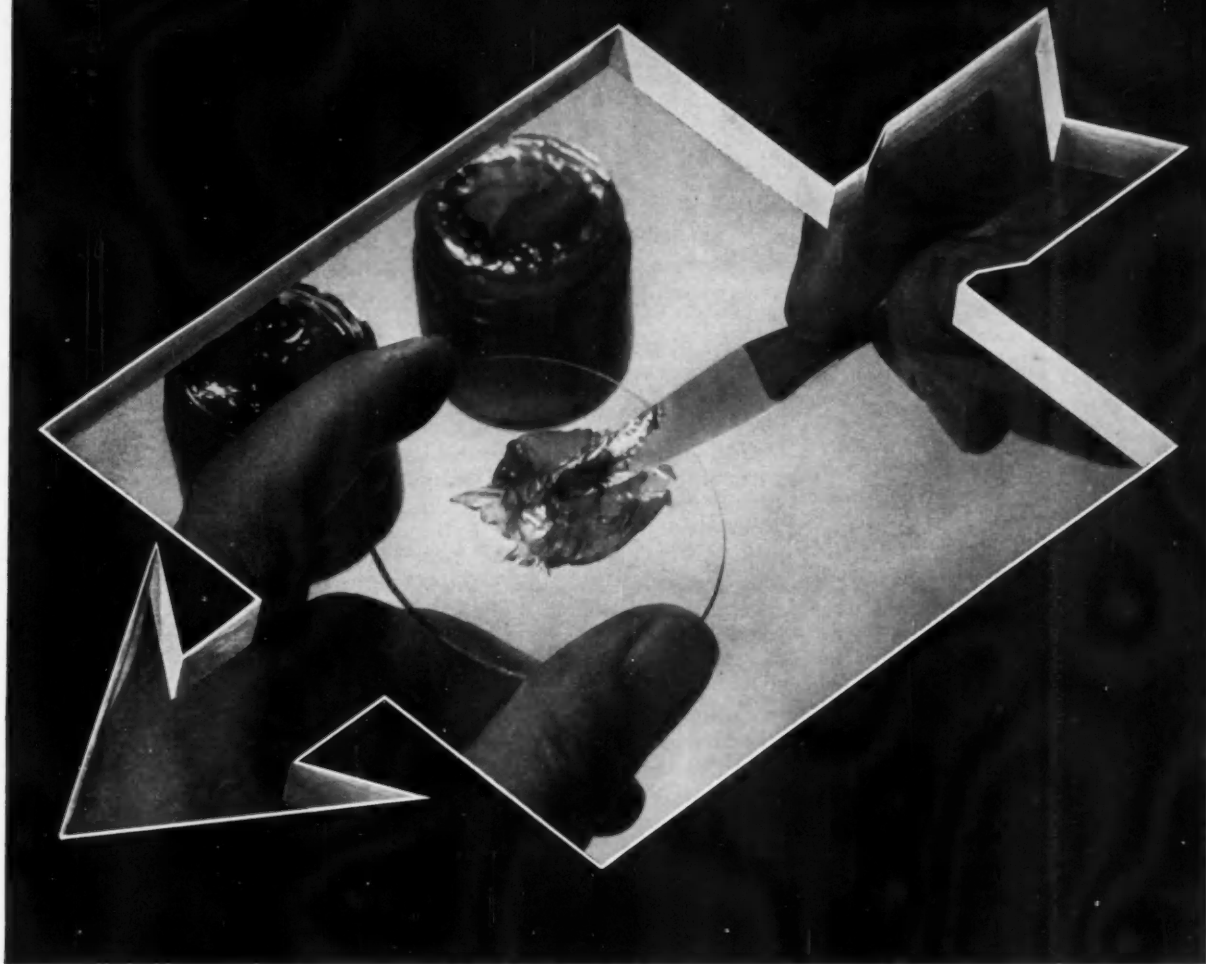
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MAKERS OF FAMOUS CUSTOM-BLENDED BLUE SUNOCO GASOLINES



Observations

By Joseph Geschelin

Electric Vehicles

The current interest in electric vehicles—at least the current publicity—reminds the writer that his first job, before starting engineering school, was with the Ward Electric Co. This was an awful long time ago when we were sixteen. The company built a line of heavy duty trucks but the bread-and-butter line was the multi-stop delivery bakery truck. The last models in the heavy duty line were quite modern in concept. The electric motor was up front, driving through a long propeller shaft to a truck type rear axle. The battery cradle was split to provide a tunnel for the driveshaft. Even in those days there were transportation consultants whose job it was to map the multi-stop route for each vehicle, using a city map. As you may suspect this had to be done because of limited cruising radius and the embarrassment that would ensue if a truck ran out of juice before it could get back to the garage. The A. E. Friedgen organization of New York has been in the transportation consulting business since those early days. And it just happens, too, that "AE" was my boss at Ward Electric. We also recall those were the days when people were sure it was only a matter of time before the gasoline motor car would go out of style. And Thomas Edison visualized a system of highways dotted with small sub-stations where a tourist could stop to get a booster charge for his electric.

Engine Location

We had occasion recently to look up a report on the pros and cons of front wheel drive and rear engined drive prepared for the writer back

in 1949 by a prominent chief engineer. Oddly enough this engineer saw few advantages with either configuration, although he listed some major disadvantages. On the other hand, it is only fair to say that the disadvantages were based upon the conventional cars of the day long before anyone visualized the acceptance of compact cars with their smaller and lighter powerplants. Yet the classical disadvantages of front drive still appear to have validity. One point is the transfer of weight to the rear when negotiating a grade. There is always the possibility of trouble when the pavement is wet or covered with snow. Reduced traction and poor tire adhesion could make the going quite difficult. Another strictly mechanical problem is the matter of short drive shafts which may require the more expensive constant velocity universal joints. It will be interesting to see how these problems are resolved in a small car of modern concept.

Over Drive

Overdrive antedates the general introduction of automatic transmissions. And some years ago there seemed to be evidence that this useful adjunct to a manual shift transmission was about to pass out of the picture. To the delight of its inventor as well as its producer overdrive has continued to be in demand. In fact, according to a brief line in the AI Statistical Issue, March 15, 1960 it was specified on 4.05 per cent of cars produced in 1959, compared with 3.18 per cent in 1958.

Engine Credits

We draw the attention of engine designers and all others interested

in engines to a new tabulation in the 1960 Statistical Issue of AI. This is a page of specifications (page 122) devoted to Optional Engine Data. The tabulation was developed to satisfy the request for some data on passenger car engines, designated as optional. The point is that the regular tabulation lists only the engine that is standard for each car model. Up to now the optional engines have not been listed at all. We hope this abbreviated table will satisfy some of our friends.

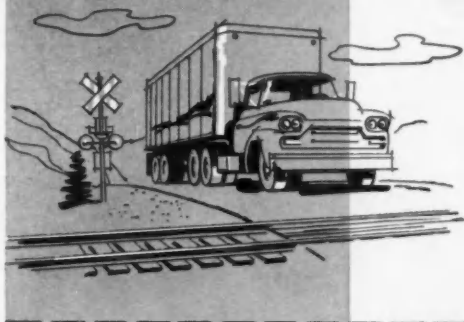
General Purpose

We attended a meeting of the Users General Purpose Machine Tool Standardization Group in March. See AI for a full report. Basically, this group is aiming at the standardization of certain features of machine tools to provide a minimum clearance for fixtures and tools; for standard Tee-slots with standard spacing; standard work height; standard taper spindles, etc. Incidentally, the Ford representative at this meeting mentioned that the Ford Tractor division has just placed an order for nine dial type machines, employing the new building block standard recently adopted by NMTBA. Note to machine tool makers: Ford says they are ready to buy new machine tools any time they can be assured of lower costs. ■

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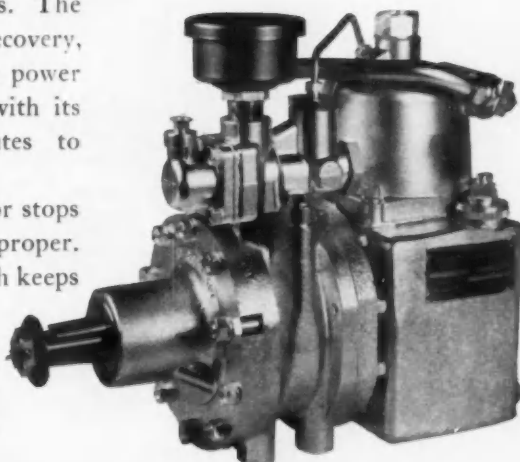
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Trucks equipped with Wagner Lockheed Rotary Air Compressors always have plenty of air for safe, sure stops. The time-proven rotary action contributes to rapid pressure recovery, assuring ample air reserve. This means safer stopping power even under severe braking conditions. Rotary action, with its overlapping air compression impulses, also contributes to smoother, quieter operation of unit.

Pumping is regulated by a control valve which starts or stops compression by "loading" or "unloading" the compressor proper. This action establishes an intermittent pumping cycle which keeps reservoir pressure within the desired range.

Available in either 9 C.F.M. capacity, air or water cooled; or 12 C.F.M. capacity, water cooled. Also in "Drive-Thru" type.



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Rotary Air Compressor is designed for use on diesel engine trucks. It features all the advantages of rotary compression.

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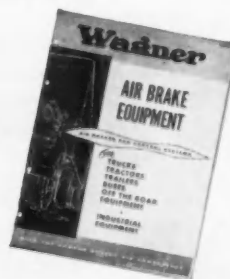
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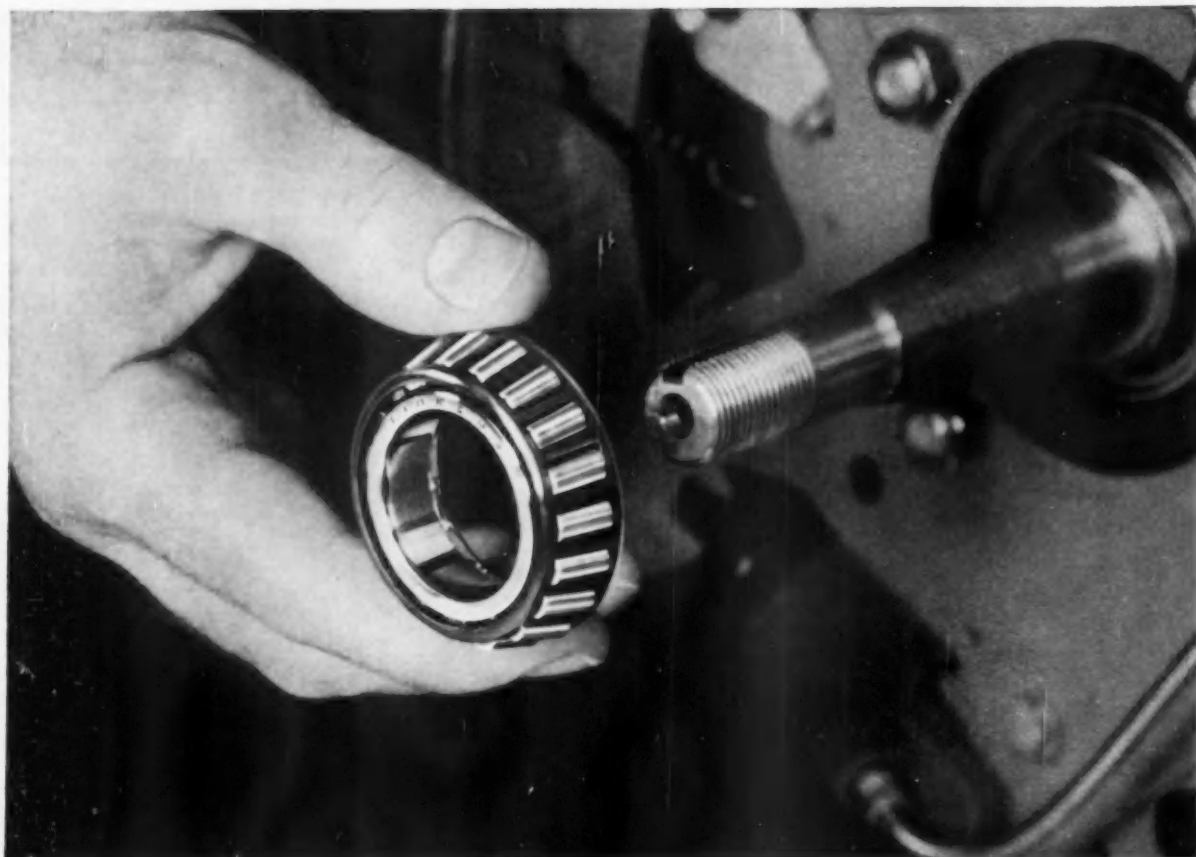


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TIMKEN® IS QUALITY



A car can't be better than its bearings. And in bearings, there's just one name for top quality—Timken® tapered roller bearings.

Your engineers know this. They know from experience that Timken tapered roller bearings give trouble-free performance that keeps customers sold; on test stands Timken bearings consistently demonstrate their superiority. And they know that Timken bearings' dimensional uniformity provides faster and easier assembly and adjustment.

All this is no accident. Starting with the finest bearing-quality alloy steel available, Timken

"Green Light" bearings are produced in the most modern bearing plant in the world. The result is a bearing of uniform high quality and capacity that costs no more—actually costs less in the long run.

So if you're looking for ways to cut warranty and assembly costs, ask your engineers about Timken bearings. Specify "Timken" instead of a part number. You'll get the benefit of 60 years' concentration on just one kind of bearing. The Timken Roller Bearing Company, Canton 6, Ohio. Cable: "TIMROSCO". Makers of Tapered Roller Bearings, Fine Alloy Steels and Removable Rock Bits.

TIMKEN "GREEN LIGHT" BEARINGS MEAN:

- Lower Prices
- Lower Warranty Costs
- Lower Costs of Assembly



BETTER-NESS rolls on
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CUT YOUR FASTENING COST...

where it matters most!

**Studies have shown that the cost of applying a fastener is more than four times the cost of the fastener itself.*



For each \$1,000 you spend for fasteners, you're probably investing **AN EXTRA \$4,000*** to install those same fasteners! Shakeproof has found the most effective way to reduce this major part of assembly cost . . . on-the-line engineering.

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In your plant, out on the line, a Shakeproof idea engineer carefully studies an assembly operation. By watching, asking and listening, he uncovers fastening problems or areas where product performance can be improved through improved fastening techniques. He then applies his specialized knowledge of fasteners and assembly methods to simplify and improve both the product and assembly operation. He might recommend one of the broad line of Shakeproof fasteners to solve the problem or to increase product efficiency. Or, if greater economies and improved product performance can be achieved with a special-purpose fastener, he will design a Shakeproof product specifically for your application. In either case, the Shakeproof idea engineer will provide you with samples to use and test in your own plant.

Arrange for a Shakeproof idea engineer to visit your plant soon. Discover how Shakeproof On-the-Line Engineering can help cut *your* fastening cost . . . where it matters most!



SEND FOR THIS FREE BOOKLET "On-the-Line Engineering" gives specific examples of time and money saving Shakeproof fastener applications and offers free samples.

Look to Shakeproof—the Leader in Fastening.



SHAKEPROOF

"FASTENING HEADQUARTERS"®
DIVISION OF ILLINOIS TOOL WORKS

St. Charles Road, Elgin, Illinois
In Canada: Shakeproof/Fastex

Division of Canada Illinois Tools Limited, 67 Scarsdale Road, Don Mills, Ontario

Circle 149 on Inquiry Card for more data



*Proving ground
for*
**AUTOMOTIVE
CHEMICALS**

It starts with a phone call . . . or an exchange of ideas through the mail. Then two men meet and start working together. One is an automotive engineer, the other a development chemist in Dow's Automotive Chemicals Laboratories. Their common interest is an advanced automotive design feature—one in which an equally advanced product of automotive chemistry will play an important role. In the area of cooling systems, for example, several new developments loom on the horizon . . .

EBULLIENT COOLING PROMISES CLOSED SYSTEM, FEWER WORKING PARTS

Originally proposed for vehicle use back in the 1920's, the principle of ebullient cooling was tempting; but a workable system was stymied for reasons which today are obsolete, such as the lack of an efficient coolant. Today, automotive engineers and Dow research chemists with new coolants are taking a closer look.

Ebullient, or "vapor phase" cooling is based on the principle of cooling by boiling. Highly simplified, the liquid coolant in the engine block is "boiled out" and passed to the radiator as a vapor. There it is condensed to a liquid and returned to the engine. Thus, heat is absorbed by vaporization, rather than by the sensible heat of the coolant. Ebullient cooling eliminates the thermostats and the water pumps of the

conventional system, and most important of all, it may be a giant step toward the goal of all cooling system engineers—a sealed cooling system!

Ebullient vs. Conventional

At Dow's Automotive Chemicals Laboratories, preliminary tests have been conducted on a passenger automobile matching an ebullient cooling system

Recording temperatures of engine parts in ebullient cooling research.



and a conventional system. The heat transfer coefficients in the valve and cylinder wall areas for the ebullient system were found to be two to three times higher than for the conventional cooling system!

Automotive cooling systems have always been a subject of intense study by Dow's automotive development staff. Dow is a basic producer of ethylene glycol coolants, and through the years Dow corrosion engineers screened many corrosion inhibitor combinations for one that could be used in all sections of the country. Since the main offenders in a cooling system are water impurities and their variants, it was decided to formulate a totally compounded fluid to eliminate the need to add water to the radiator. Thus, after a series of exhaustive performance tests, came DOWGARD®, the world's first year 'round cooling system fluid. A blend of a completely new combination of protective chemicals, and specially treated de-ionized water, DOWGARD gives superior protection to all cooling system metals—including aluminum!

**Trademark*

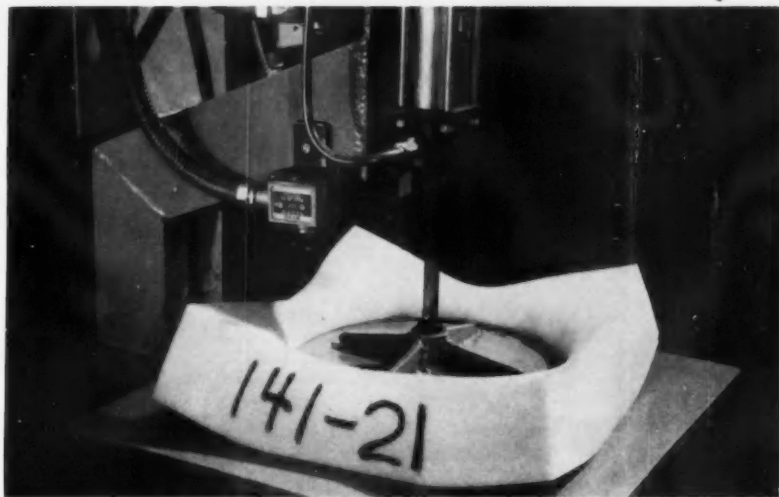
NaOH: Workhorse in new flake form

The announcement that Dow has introduced a greatly improved new flake form of caustic soda . . . offering higher Na_2O content, and virtual dustlessness



New ground caustic flake
is virtually dustless.

has been welcome news to the automotive industry. In many automotive plants, fast-acting formulations containing Dow caustic soda serve as metal cleaners, paint strippers, and waste disposal aids. Quick, dependable supplies of Dow caustic soda are available in all six forms: 50% and 73% solutions, as well as solid, flake, 1/4-inch flake, ground flake.



Testing polyurethane foam for dynamic flexing.

POLYGLYCOLS: from where you sit

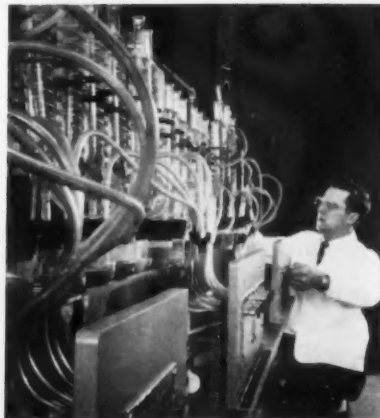
In a driver's seat, resiliency, rigidity, and tensile strength are requirements for safe, comfortable driving. In the Dow Automotive Chemicals Laboratories, these are requirements for Voranol®, Dow resin-grade polyglycols used to make polyurethane foam seat cushions. Like the coolants, additives, and fluids that go under the hood, they were sub-

jected to the same exhaustive research . . . are subject to the same high-purity requirements in Dow's automotive chemicals labs. And someday, you may see entire seat assemblies formed of this soft, yet tough material. Or in denser form, they may even be used to make pneumatic tires with a service life of several hundred thousand miles.

**Trademark*

The many faces of amine

Another versatile "soldier" in Dow's array of automotive chemicals, the amines serve the automotive industry as ethanolamine soaps, combined with soluble oils, for lubricating and cooling cutting tools . . . triethanolamine has been used as an anti-corrosion additive in antifreeze solutions and hydraulic brake fluid formulations . . . automotive polishes are based on ethanolamine derivatives . . . and amines are also used as acid neutralizers in oil filters. In short, the amines are one of the vital links in the chain between the automotive industry and Dow automotive chemicals research.



Coolant solutions subjected to
a battery of corrosion tests.

● **INFORMATION, PLEASE:** If you'd like more information on the above activities, or any area of Dow's automotive research, please write us. A member of our technical staff will give your inquiry prompt attention. Write: THE DOW CHEMICAL COMPANY, Midland, Michigan, Chemicals Merchandising Department 401T4-15; or contact a Dow sales office near you.

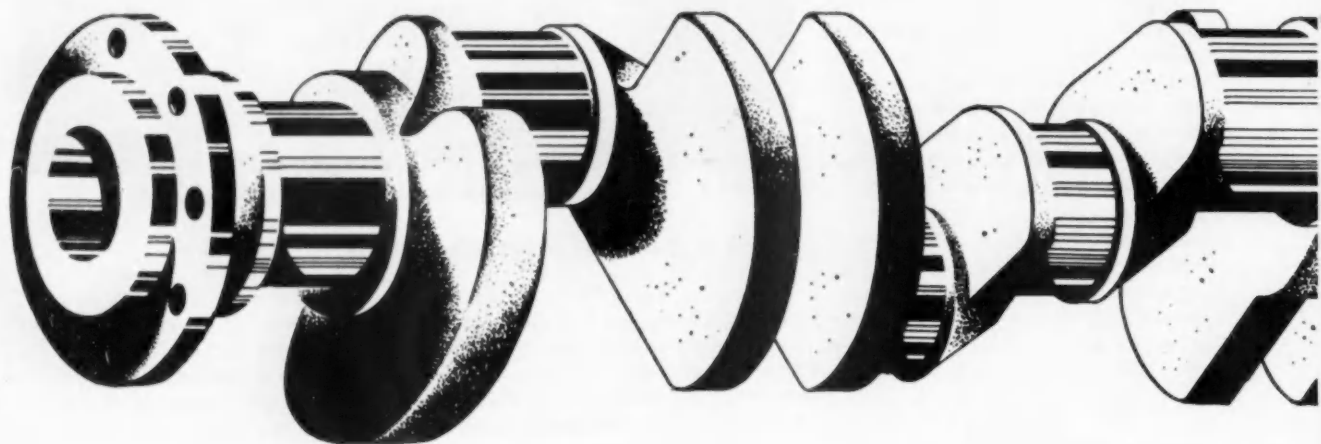
See "The Dow Hour of Great Mysteries" on NBC-TV

THE DOW CHEMICAL COMPANY

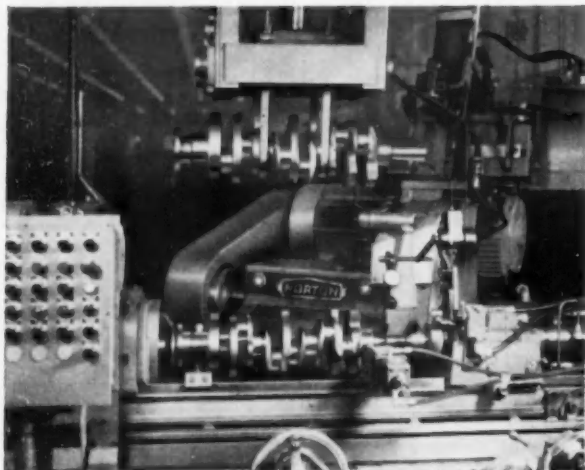
Midland, Michigan

DOW

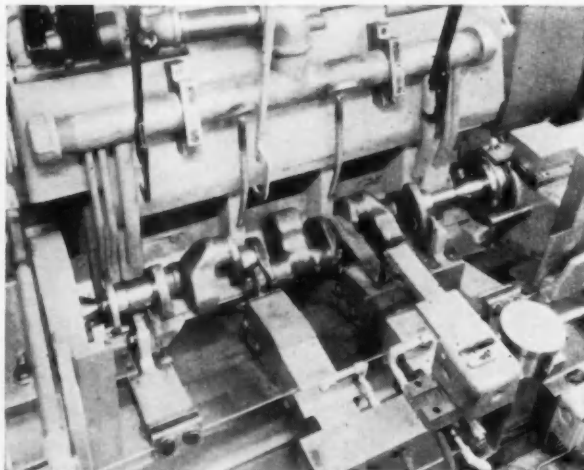
If you grind crankshafts...



*check how NORTON grinders
can reduce your costs-per-shaft*



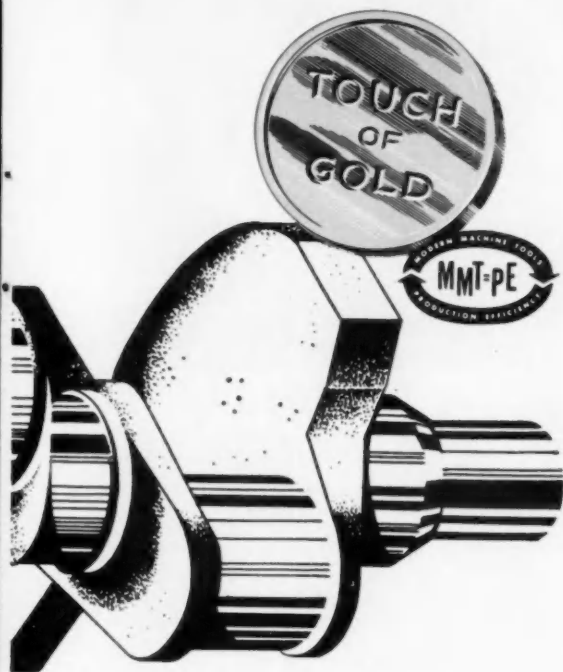
Grinding Gear Fits and shoulders is easily handled on a Norton Type C-V 4 Angular Wheelslide Grinder. By grinding thrust surface and adjacent diameter in a single, automatically controlled plunge grind, the Type C-V 4 provides fastest production with less effort.



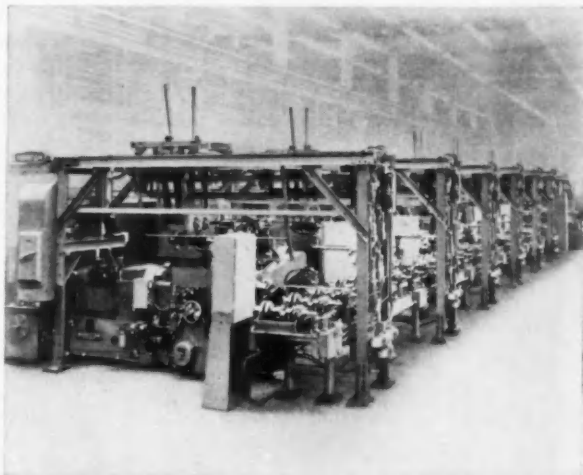
Grinding All Main Bearings At Once is a job for the Norton Type CM-1 Semi-automatic Heavy Duty Multi-Wheel Grinder. Precise finishing of a group of line diameters about as quickly as a single diameter grind assures important cost-savings. Also popular in this multi-wheel application are Type CTU Heavy Duty Cylindrical Grinders.

75 years of . . . Making better products . . .

NORTON PRODUCTS: Abrasives • Grinding Wheels • Machine Tools • Refractories • Electro-Chemicals — **BERN-MANNING DIVISION:** Coated Abrasives • Sharpening Stones • Pressure-Sensitive Tapes



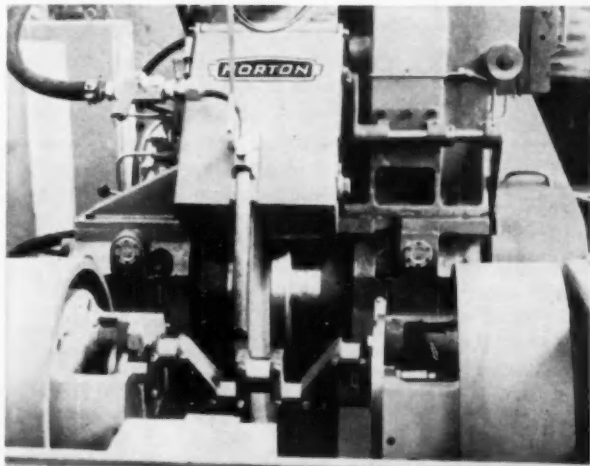
For further facts on how these grinders can benefit you, see your Norton Man, a trained grinding engineer. NORTON COMPANY, Machine Tool Division, Worcester 6, Mass. District Offices: Worcester, Hartford, Cleveland, Chicago, Detroit. In Canada: J. H. Ryder Machinery Co., Ltd., Toronto 5.



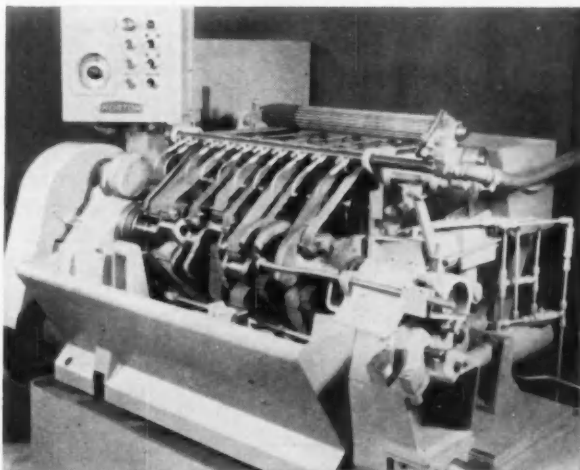
Automatic Grinding of Crankpins on a multi-station basis is handled on the No. 2 Unitized Transfer Type Crankpin Grinder. This machine combines loading, positioning, grinding, gaging, transferring and wheel-truing — a sensational advancement for big volume crankshaft production.



*Trade-Marks Reg. U. S. Pat. Off. and Foreign Countries



Simplified Grinding of Pins on shafts up to 72" long is the specialty of Norton Type CC-8 CRANK-O-MATIC® Semiautomatic Crankpin Grinders. Automatic cycling under semiautomatic control frees the operator from supplementary operations. Similar advantages for grinding pins on small shafts are provided by Norton Type CTU CRANK-O-MATIC Grinders.



Lapping Pins and Bearings simultaneously in an automatic cycle calls for the Norton No. 31 CRANK-O-LAP® Lapping Machine. Strips of coated abrasive are used as the Lapping medium in producing top-quality finishes. With headstock and footstock carried as a swing frame, manual operation is reduced to easy loading, pushing the "Start Cycle" button and unloading.

to make your products better

MACHINE TOOL DIVISION: Grinding and Lapping Machines — **G & E DIVISION:** Shapers • Gear Cutting Machines • Gear Induction Hardeners

Circle 151 on Inquiry Card for more data

Performance pays off...

in
automobiles
and
production
tools

Screw Drivers



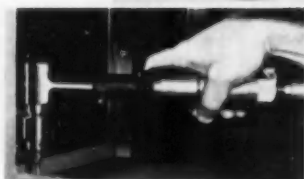
Pistol Drills



Grinders and Sanders



Right-Angle Drills



... and where production line performance stands out consistently you're apt to find Airetool air powered equipment. Compact and sturdy, like the new cars, Airetool pneumatic production tools are engineered to deliver top-notch, 'round-the-clock production with little maintenance.

For the complete story on how Airetool can bolster your production line performance write:



Branch Offices: New York, Chicago, Tulsa, Philadelphia, Houston, Baton Rouge
Representatives in principal cities of U.S.A., Canada, Mexico, South America, England, Europe, Puerto Rico, Italy, Japan, Hawaii
European Plant: Vlaardingen, The Netherlands
Canadian Plant: Brantford, Ontario

Circle 152 on Inquiry Card for more data

SAE Meeting

(Continued from page 87)

to three per cent. He stressed that performance of the machines depends a lot on the people who are operating them; also mentioned that the practice at his company is to avoid "beating the machines" by working them well within their physical limitations. As an example of the production savings possible, this speaker cited a 10-ft diam bulkhead, which formerly took about 168 hours for sculpturing, now takes 15 hours, and is planned for 9 hours. On part programming time, he said they started out with 40 hours and that it is now in the neighborhood of 20 to 30 hours.

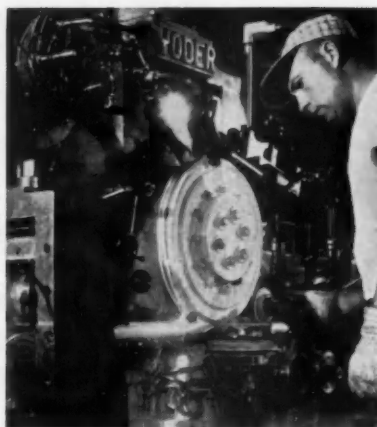
Cutting Tools

Latest developments in cutting tools were discussed by R. Hook, The Warner & Swasey Co. He said there had been three distinct trends in cutting tool materials, made up of the following types:

Ceramic tools are now established, having gone through four steps of development from the earliest work at Watertown Arsenal, to improved consistency of the material, reduction of cost, and availability of European grades of ceramics. This type of tool, the speaker said, has four principal uses—on finish-turning of uninterrupted cuts, hard materials (Rc40 range or higher), and on abrasive materials such as cast iron, and has replaced grinding by turning in some instances.

High-speed steels have been improved with the introduction of M-4 and T-15 grades, containing high amounts of vanadium and cobalt. These newer grades have displayed two to six times the life per grind compared to the older 1841 grade. Tungsten carbide coatings on HSS have also been offered, with the coatings applied by flame plating and the Sparkatron process. Real new is a "super" HSS, which the speaker thought would be competitive with the lower grades of carbides and have greater resistance to abrasion and higher weld-on temperatures. He said the sfm improvement would

(Turn to page 124, please)



Yoder Tube Mills speed tailpipe production at AP Parts Corporation

The AP Parts Corporation (Toledo, Ohio), world's largest producer of replacement mufflers and tailpipes, uses 2 YODER Tube Mills to produce more than 300 ft. of 1 3/4", 1 7/8" and 2" tubing per minute.

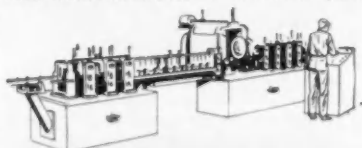
According to Mr. John Grindle, Plant Engineer, the two-man operated YODER Mills are vital to the production of the entire plant. "YODER Tube Mills earn their keep daily. They are easy to set up, maintain and operate ... the welds are clean and uniform. We depend on them for constant quality, high production and minimum downtime".

The YODER Tube Mills at AP Parts exemplify the production economies and dependability of all YODER-built equipment, whether it be Pipe and Tube Mills, Cold Roll-Forming Machinery or Slitting Equipment.

If your products require ferrous or non-ferrous pipe or tubing, from 1/4" to 26" diameters, there is a YODER Mill designed to produce it economically, accurately and efficiently.

For complete information on YODER Pipe or Tube Mills ... write for the fully illustrated, 88 page YODER Tube Mill Book ... it is yours for the asking.

THE YODER COMPANY
5553 Walworth Avenue • Cleveland 1, Ohio



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AUTOMOTIVE INDUSTRIES, April 15, 1960



How are they doing down on the farm?

Nowadays they're doing everything a lot easier, thanks to modern power-operated farm machinery.

And farm machinery producers have learned that their lot can be a lot easier, too, when they specify Ostuco Tubing. That's because there's no compromising with custom-quality Ostuco Tubing. Consistently you receive the exact tubing you want — the size, length, grade — with the strength and tolerances you need. For machined parts, you get our recommended rough size guaranteed to clean up.

In addition to these advantages, Ohio Seamless will fabricate tubular parts to your specification. Contact your nearest Ohio Seamless representative, or send part drawings to the plant at Shelby, Ohio—Birthplace of the Seamless Steel Tube Industry in America.

A-1356A

Model illustrated built to 3.5 mm scale.



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Seamless and Electric Resistance Welded Steel Tubing • Fabricating and Forging

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CANADA: Railway & Power Engr. Corp., Ltd.

EXPORT: Copperweld Steel International Company, 225 Broadway, New York 7, New York



Complimentary Copy of new Bulletin CS60 "Ostuco Steel Tubing" sent on request.

More Government Contract Awards

LATEST contracts awarded by various Government agencies, and covering primarily automotive and aviation products, are listed in the following. Typical of the items contained in these monthly listings are: passenger cars, motor trucks, aircraft, military tanks, engines, transmissions, other components, spare parts, plant equipment, etc. This list is for the period Mar. 1 to Apr. 4, inclusive.

AUTOMATIC TRANSPORTATION CO.,
DIV. YALE & TOWNE MFG. CO.,
Chicago, Ill.
Truck, fork lift, 10 ea—\$38,916

AVCO CORPORATION, LYCOMING DIV.,
Stratford, Conn.
Aircraft Engines, 126 ea—\$11,131,675

AVCO CORPORATION, LYCOMING DIV.,
Stratford, Conn.
Gas turbine engines—\$14,234,460

CARLISLE CORP., Carlisle, Pa.
Inner tubes, aircraft, 3303 ea—\$80,768

CATERPILLAR TRACTOR CO., Peoria, Ill.
Spare parts—\$18,613

CHRYSLER MOTORS CORP., Washington, D. C.
Trucks and buses, 15 ea—\$54,145

CHRYSLER MOTORS CORP., Detroit, Mich.
Truck, 24 ea—\$63,434

CINCINNATI MILLING & GRINDING MACHINES, INC., Cincinnati, Ohio
Machine, milling, 1 ea—\$29,999

CLARK EQUIPMENT CO., Buchanan, Mich.
Trucks, forklift, 14 ea—\$357,778

THE COBEY CORP., Galion, Ohio
Truck, materials handling, 82 ea—\$172,300

CURTISS WRIGHT CORP., WRIGHT AERONAUTICAL DIV., Wood Ridge, N. J.
Aircraft engine, 76 ea—\$2,507,618

CUSHMAN MOTORS WORKS, INC., Lincoln, Nebr.
Motorscooters, 27 ea—\$22,397

DORSEY TRAILERS, INC., Elba, Ala.
Semi-trailers, 120 ea—\$414,908

DOUGLAS AIRCRAFT CO., Santa Monica, Calif.
Nike replenishment spare parts—\$404,804

J. H. ELLIOTT CO., Washington, D. C.
Lathes, engine, 3 ea—\$46,832

EX-CELLO-O CORP., Detroit, Mich.
Grinding machine, 1 ea—\$44,482

FIRESTONE TIRE & RUBBER CO., THE, DEFENSE PRODUCTS DIV., Akron, Ohio
Tires, pneumatic aircraft, 1,405 ea—\$479,479

FORD MOTOR COMPANY, FORD DIV., Dearborn, Mich.
Trucks, 78 ea—\$258,292

FORD MOTOR CO., Detroit, Mich.
Cargo pickup trucks, 3,490—\$4,636,245

FORD MOTOR COMPANY, Detroit, Mich.
1,065 pick-up trucks—\$2,402,013

FORD DIV., FORD MOTOR CO., Washington, D. C.
Trucks, 6 ea—\$16,061

FORD DIV. OF FORD MOTOR CO., Washington, D. C.
Trucks and buses, 16 ea—\$48,077

CHEVROLET MOTOR DIV., GENERAL MOTORS CORP., Detroit, Mich.
School buses, 3 ea—\$12,677

GENERAL MOTORS CORP., CHEV. MOTOR DIV., Detroit, Mich.
Trucks and buses, 34 ea—\$94,325

GENERAL MOTORS CORP., FOREIGN DIST. DIV., New York, N. Y.
Light trucks, 7 ea—\$13,128

GENERAL MOTORS CORP., FOREIGN DIST. DIV., New York, N. Y.
Sedans, 43 ea—\$67,165

GENERAL TIRE & RUBBER CO., The, Akron, Ohio
Tires, pneumatic aircraft, 6,684 ea—\$637,420


GISHOLT MACHINE CO., Madison, Wis.
Lathe, turret, 3 ea—\$60,146

GENERAL ELECTRIC CO., SMALL AIRCRAFT ENGINE DEPT., Schenectady, N. Y.
J85 jet engines—\$8,300,000


GENERAL ELECTRIC CO., SMALL AIRCRAFT ENGINE DEPT., Schenectady, N. Y.
T58 gas turbine engines—\$5,500,000

GENERAL ELECTRIC CO., SMALL AIRCRAFT ENGINE DEPT., West Lynn, Mass.
Helicopters, aircraft, 257 ea—\$3,300,000


GENERAL ELECTRIC CO., SMALL AIRCRAFT ENGINE DEPT., West Lynn, Mass.
Turboshaft engines, 204 ea—\$5,500,000




P-1032-U



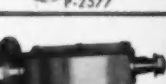
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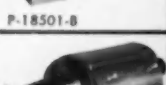
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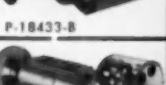
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P-18433-B



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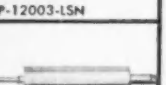
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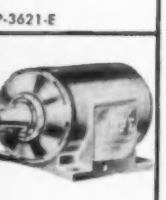
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P-12003-LSN



P-3621-E



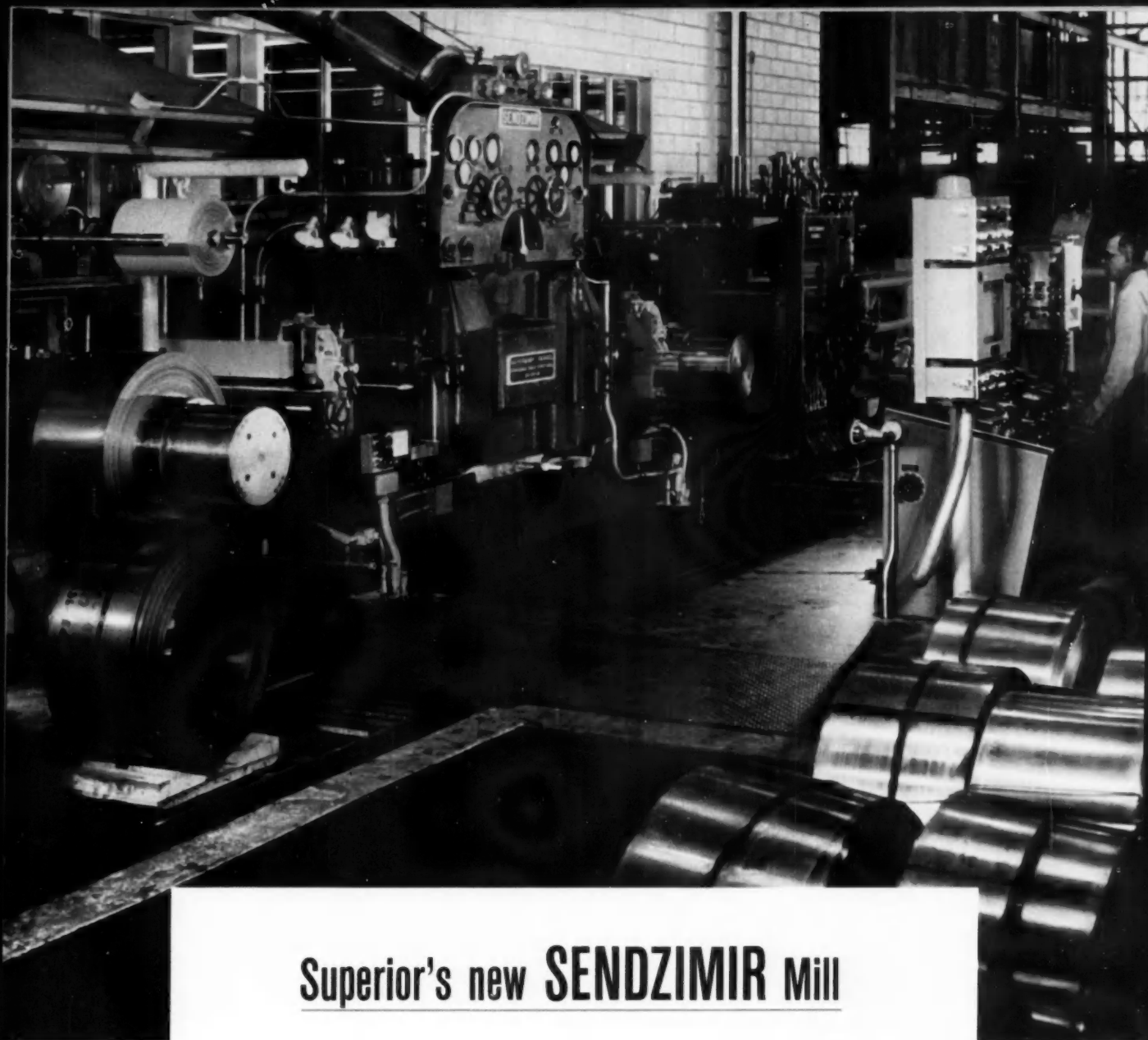
Precision Driving Motors
1 to 20 HP, 900 to 3600
RPM

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ENGINEERS, DESIGNS AND BUILDS
PRECISION ANTI-FRICTION BEARING SPINDLES
FOR EVERY PURPOSE

Established 1920



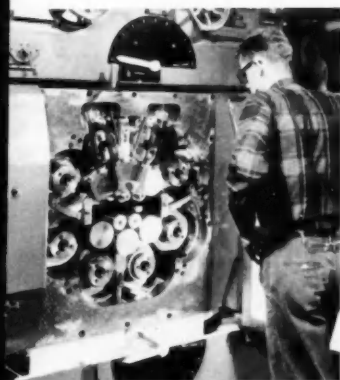
Superior's new SENDZIMIR Mill

Fine-watch precision— great power, rigidly controlled!

The ultimate in dimensional accuracy and finish is now available in Superior Strip Steel . . . in widths up to 24" . . . in larger and heavier coils . . . thanks to our new Sendzimir Mill with electronic continuous gage control. Strip is reduced to final gage at speeds reaching 1,000 feet per minute—every foot within required tolerances, beautifully finished for your most particular product requirements. Let us serve you with Superior Strip Steel *finer than the finest obtainable until now!* Write us about your requirements.

Superior

STRIP STEEL



Close-up of the 18 back-up rolls providing tremendous power and rigidity to super-finished work rolls, for flawless precision strip production.



SUPERIOR STEEL DIVISION

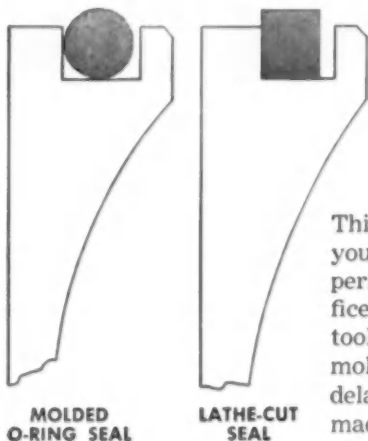
OF
COPPERWELD STEEL COMPANY
CARNEGIE, PENNSYLVANIA

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Why ACADIA

LATHE-CUT SYNTHETIC RUBBER SEALS

can save you money in
STATIC or MOVING
seal applications



This seal will save you money with no performance sacrifice. Minimum tooling cost, no molds, no costly delays. Can be made up to 25" I.D.

Acadia Synthetic Rubber Parts are of the highest quality components, processed for oil resistance, good aging properties, resistance to heat. They can be furnished in any dimension or special compound you desire to precision tolerances. They are another example of Acadia's ability to **SAVE YOU MORE..SERVE YOU BETTER.**

ACADIA

Synthetic
PRODUCTS



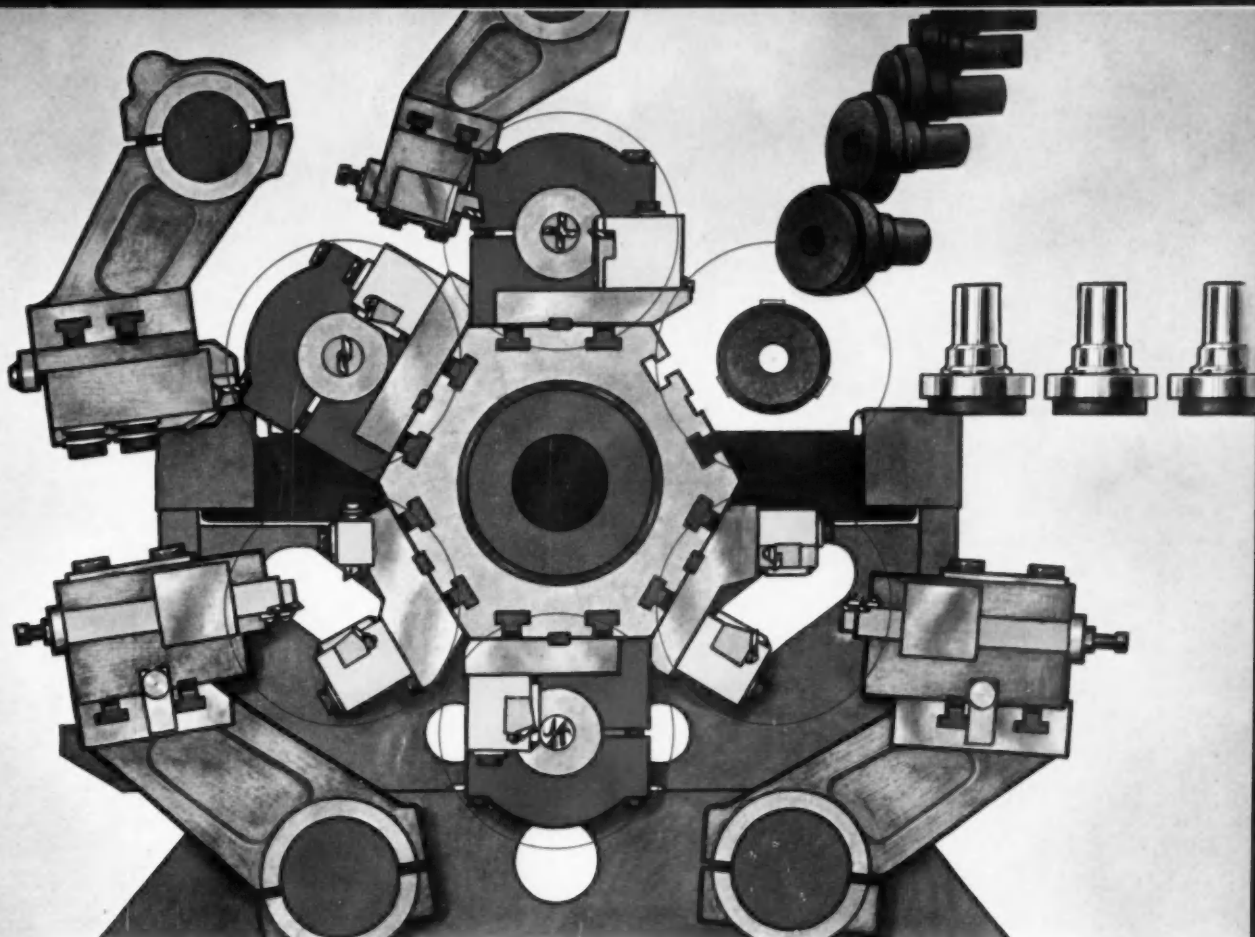
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There's an Acadia Sales engineer near you to serve you. Write us today, and we'll put him in touch with you immediately.

MANUFACTURERS AND CUTTERS OF WOOL FELT

Circle 157 on Inquiry Card for more data

Circle 158 on Inquiry Card for more data →



Open secret of New Britain superiority

Wide-open design makes the most fundamental difference between a New Britain automatic chucking machine and other machines. It speaks for itself as a means of getting at the tooling, making adjustments and clearing chips.

Massiveness, right from the floor up, is equally apparent and equally important in chucker work. You see it in the way the cutting tools make the heaviest cuts with a chatter-free smoothness that can't be duplicated.

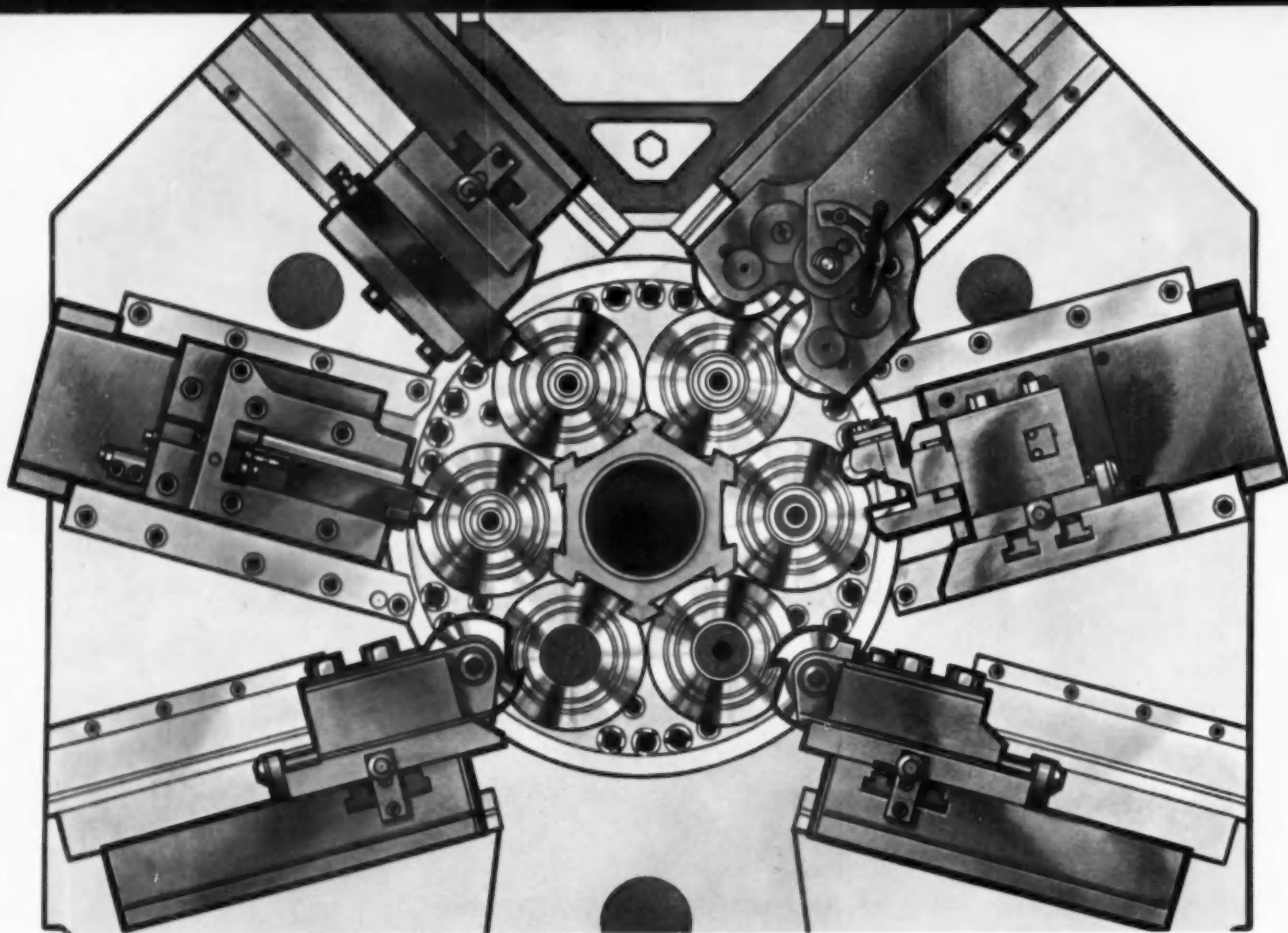
Only New Britain provides a combination of longitudinal with transverse forming motion where needed. This versatility eliminates the need for second operation machines in many cases—particularly when a job is setup for double indexing

for fast two-at-a-time production.

New Britain spares no pains to incorporate every new development to make chucker-type machining more profitable. The open-end design lends itself particularly well to magazine loading and unloading, for example, and many New Britains are being equipped to provide this feature.

Whenever a number of operations are required on cast or forged pieces, these massive, rugged, powerful machines offer great possibilities for savings through faster, more accurate, more reliable production. A new and complete catalog on the New Britain chucker line is just off the press. We would be very glad to send you your copy.

THE NEW BRITAIN MACHINE COMPANY
New Britain-Gridley Machine Division • New Britain, Connecticut



New Britain's answer to a serious threat

Overseas production of just about anything you care to name is making serious inroads on American domestic and foreign markets. It's no secret that European and Asian industry is catching up fast technologically—and they have a real competitive advantage in plenty of low cost skilled labor. While many foreign products are still inferior to those of domestic manufacture, this is far from true in all cases. The answer is, of course, increased productivity at lower cost.

In its all-new line of bar machines, New Britain has developed the most modern bar-turning units available. Five models in two different series are offered with capacities from $1\frac{1}{4}$ " to $5\frac{1}{8}$ ". These machines are designed for really fast, trouble-free, high-precision production. More operations

per machine are possible than ever before. Wide open tool areas allow unlimited combinations of end working and forming tools. New Britains will stay new longer. The exclusive wear-preventing features so familiar to New Britain users have been retained and improved. Catalogs on both the small and large series machines are yours for the asking. After looking this literature over if you think one or more New Britains may help improve your competitive situation, we will be happy to review your prints and arrange a demonstration. No obligation, of course. Call us or call your local representative.

New Britain-Gridley Machine Division, The New Britain Machine Company, New Britain, Connecticut.

THE NEW BRITAIN MACHINE COMPANY
New Britain-Gridley Machine Division • New Britain, Connecticut



wheels that speak with international good taste

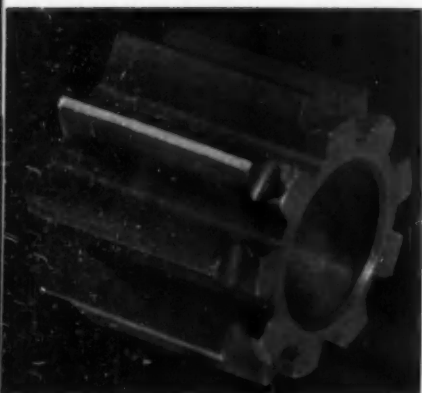
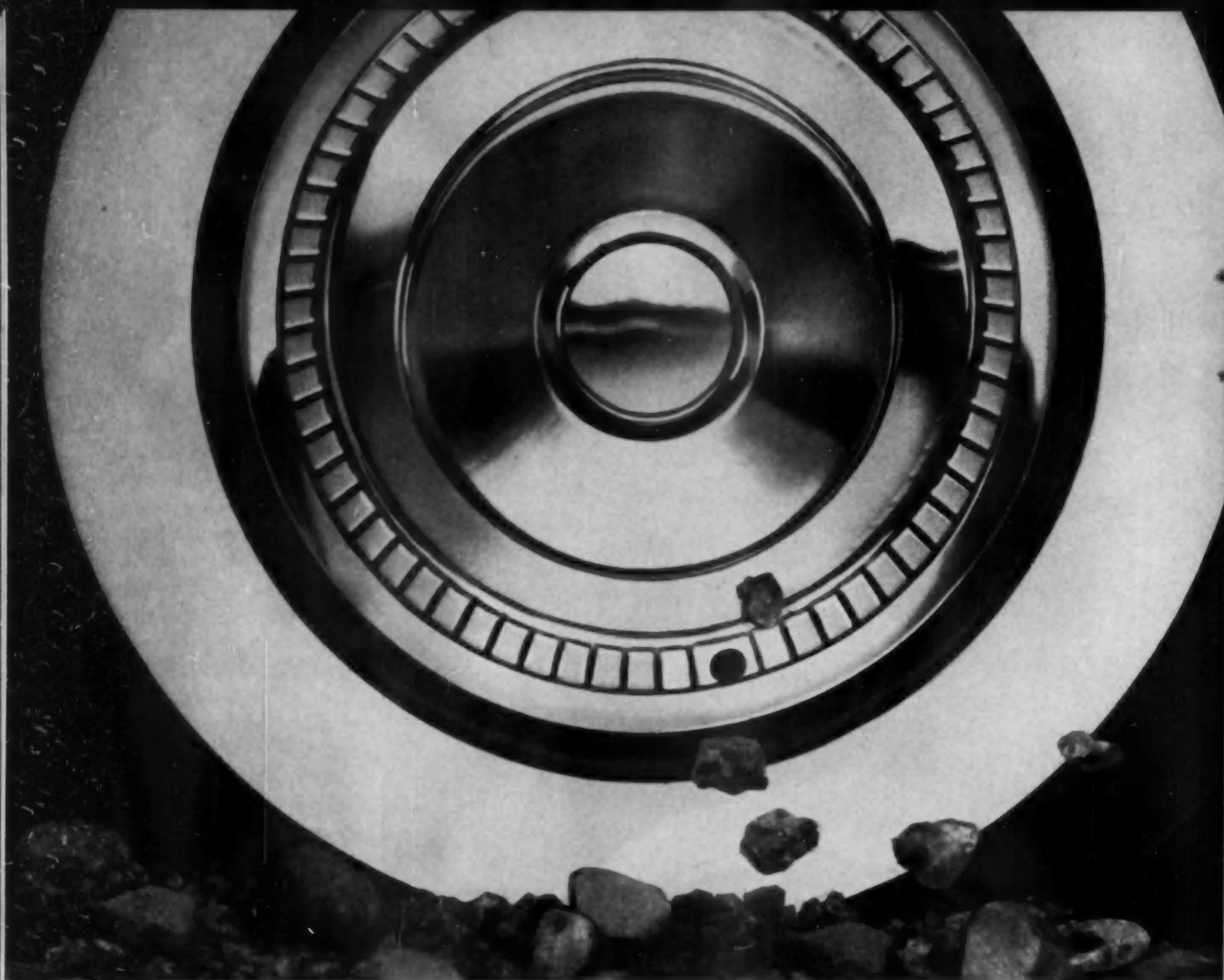
Working closely with the automotive industry for over fifty years, Kelsey-Hayes has pioneered many major advances in wheel and brake design. Among the most recent is the new integral cast-aluminum hub and drum, wherein the braking surface is provided by a special iron liner metallurgically bonded in place. Exposed to the air-stream, through a specially designed steel wheel, its ribbed aluminum structure affords maximum cooling for uniform, fade-free brake performance and greatly extended life. Kelsey-Hayes Company, Detroit 32, Michigan.

KELSEY HAYES COMPANY

Automotive, Aviation and Agricultural Parts
Hand Tools for Industry and Home

18 PLANTS: Detroit and Jackson, Michigan;
Los Angeles; Philadelphia and McKeesport,
Pennsylvania; Springfield, Ohio; New Hartford
and Utica, New York; Davenport, Iowa;
Windsor, Ontario, Canada.



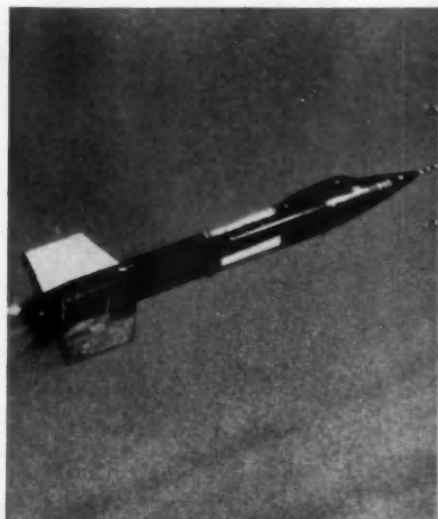


THE "BEAUTY" OF REPUBLIC COLD DRAWN ALLOY STEEL in this drive pinion is strength and toughness needed to withstand severe torque, impact, and prolonged wear—plus the benefit of better machinability at reasonable cost. In addition to alloy, Republic offers cold drawn carbon, stainless, and titanium bars.

THE "BEAUTY" OF REPUBLIC SPECIAL SECTIONS is that built-up, interlocking, or associated parts can be eliminated. Formed to the predominating cross section of the shape, Republic Cold Drawn Special Section Bars assure strong, one-piece parts . . . longer wearing parts that cost less to produce. Republic Special Sections are available in carbon, alloy, and stainless steel.



THE "BEAUTY" OF TITANIUM in North American Aviation's X-15 research vehicle is its dependability under extreme high and low temperature fluctuations. Republic—the world's largest producer of stainless and alloy steels—is supplying type RS-110A titanium alloy for the X-15.



THE "BEAUTY" OF STAINLESS

...parts subjected to rough service prove it!

Design and performance advantages unsurpassed by any other commercial metal . . . that's the "beauty" of stainless steel.

Take wheel covers, for example, or any part that must stand up to rough, tough service. No need to over-design with stainless. The metal's exceptionally high strength-to-weight ratio permits the use of lighter gages without sacrificing the strength needed to withstand denting and abrasion. And, no need

for expensive platings or coatings to enhance the corrosion-resistance or stay-new-forever appearance of stainless.

High-style, functional, easily formed stainless steel is supplied by Republic in more than 30 types for thousands of applications. Metallurgical service available to help you select, apply, and process. Mail the coupon for more information on the metal that does more than just go along for the ride.



REPUBLIC STEEL

*World's Widest Range
of Standard Steels and Steel Products*



This Stainless STEELMARK of the American Steel Industry is your assurance that a product is made of stainless steel.

Circle 160 on Inquiry Card for more data

REPUBLIC STEEL CORPORATION

DEPT. AI-9140

1441 REPUBLIC BUILDING • CLEVELAND 1, OHIO

Please send more information on:

- ☐ Stainless Steel ☐ Alloy Steel
☐ Titanium ☐ Special Section Bars

Have a metallurgist call:

- ☐ Stainless Steel ☐ Alloy Steel ☐ Titanium

Name _____ Title _____

Company _____

Address _____

City _____ Zone _____ State _____

More Government Contract Awards

(Continued from page 104)

B. F. GOODRICH AVIATION PRODUCTS, A DIV. OF B. F. GOODRICH CO., Akron, Ohio
Tires, pneumatic aircraft, 19,276—\$1,188,513
GOODYEAR TIRE & RUBBER CO., THE, Akron, Ohio
Tires, pneumatic aircraft, inner tubes, 10,481—\$500,276
GRUMMAN AIRCRAFT ENGINEERING CORP., Bethpage, Long Island, N. Y.
Naval aircraft—\$128,000,000
INTERNATIONAL HARVESTER CO., Chicago, Ill.
303 Five-ton trucks—\$1,682,000

INTERNATIONAL HARVESTER CO., Washington, D. C.
Stake trucks, 7 ea—\$34,518
INTERNATIONAL HARVESTER CO., Washington, D. C.
Trucks and buses, 14 ea—\$64,899
INTERNATIONAL HARVESTER CO., Washington, D. C.
Comb. school bus and cargo carrying vehicles, 3 ea—\$11,824
INTERNATIONAL HARVESTER CO., Washington, D. C.
1308 trucks—\$3,180,201



AVENUE TO THE RIGHT MOTOR...



110 Volt DC servo motor designed with maximum torque-to-inertia ratio for tape reel drive on computers. Frame 5 1/4 x 6



24 Volt DC aircraft motor for windshield wiper drive. Includes radio interference filter. Frame 2 1/2 x 1 1/2



Totally enclosed submersible 24 volt DC motor for tank ventilating fan drive. Frame 5 x 2 1/4

Rigid and detailed testing assure desired performance

Thorough study by our engineering department of your product and its operating conditions enables us to design a Lamb® motor that will meet your exact requirements.

After rigid and detailed testing, we then mass produce the motor to obtain the most favorable cost.

May we discuss these advantages of Lamb motors with you?



WRITE FOR YOUR COPY...
6-page folder describes these and other Lamb Electric motors.

Lamb Electric
SPECIAL APPLICATION FRACTIONAL HORSEPOWER **MOTORS**

THE LAMB ELECTRIC COMPANY • KENT, OHIO
A Division of American Machine and Metals, Inc.
In Canada: Lamb Electric —
Division of Sangamo Company Ltd. — Leaside, Ontario

LINDE CO., DIV. OF UNION CARBIDE CORP., New York 17, N. Y.
Machine, flame cutting—qty. 1 ea—\$75,050
MACHINERY ASSOCIATES, INC., Wynnwood, Pa.
Boring, drilling, milling machine, 1 ea—\$162,734
MACHINERY ASSOCIATES, INC., Wynnwood, Pa.
Lathes, engine—qty. 3 lot—\$48,027
THE MARTIN COMPANY, Orlando, Fla.
Missile and related equipment—\$11,000,000
NORTH AMERICAN AVIATION, INC., ROCKETDYNE DIV., Canoga Park, Calif.
Engine spare parts—\$25,000
NORTH AMERICAN AVIATION, INC., Canoga Park, Calif.
Motor for the Saturn project—\$4,452,073
NORTHROP CORP., Los Angeles, Calif.
Production and engineering Hawk Missile—\$22,647,800
THE PUGET SOUND BRIDGE & DRY-DOCK CO., Seattle, Wash.
Guided missile destroyers—\$47,099,934
RAYTHEON COMPANY, Waltham, Mass.
Hawk missile ground support equipment—\$12,500,000
RAYTHEON COMPANY, Waltham, Mass.
Missile systems—\$9,314,348
THE FRANK G. SCHENUIT RUBBER CO., Baltimore, Md.
Tires, pneumatic aircraft, 11,909 ea—\$444,770
STUDEBAKER-PACKARD CORP., South Bend, Ind.
Truck, 65 ea—\$126,659
UNION CARBIDE CONSUMER PRODUCTS CO., DIV. OF UNION CARBIDE CORP., New York, N. Y.
Battery, dry, 84,780 ea—\$103,951
UNITED AIRCRAFT CORP., HAMILTON STANDARD DIV., Windsor Locks, Conn.
Starter, combustion, aircraft engine, 150 ea—\$264,000
UNITED AIRCRAFT CORP., PRATT & WHITNEY AIRCRAFT DIV., E. Hartford, Conn.
Engines—\$45,845,430
UNITED AIRCRAFT CORP., SIKORSKY AIRCRAFT DIV., Stratford, Conn.
Turbine powered helicopters—\$45,000,000
UNITED STATES RUBBER CO., Attn: Government Dept., Detroit, Mich.
Tires, pneumatic aircraft, 5301 ea—\$255,066
UNITED STATES RUBBER CO., Detroit, Mich.
Tires, pneumatic aircraft, 6100 ea—\$201,422
WASHINGTON IMPERIAL CO., Washington 6, D. C.
Lathe, engine, 4 ea—\$25,971
WESTERN ELECTRIC CO., New York
Nike repair parts—\$90,720
WESTERN ELECTRIC CO., INC., New York, N. Y.
Nike spare parts and components—\$1,690,779
WILLYS MOTORS, INC., Toledo, Ohio
Truck, 17 ea—\$37,465
89 ea 218,999
106 256,464
WILLYS MOTORS, INC., Toledo, Ohio
"Jeep" vehicles—\$666,134

**AUTOMOTIVE INDUSTRIES
KEEPS YOU INFORMED**

Manufacturers' News

Kaman Expands Plant

Kaman Aircraft Corp. has started construction of a series of buildings at Bloomfield, Conn., which will add 41,000 sq ft of floor space to its manufacturing facilities. Expansion in the last year will increase Kaman's floor space by 25 per cent.

Perfection's New Building

Perfection Automotive Products Corp. is occupying its new plant at 12445 Levan Rd., Livonia, Mich. Jerome M. Ash, vice president, said the building provides additional capacity and allows the company to fabricate, paint, assemble, package and ship its products.

Dunlop Plant Opens

Production of passenger tires is under way at Dunlop Tire & Rubber Co.'s new facility in Tonawanda, N. Y. Passenger tire making capacity has been increased more than 15 per cent. Dunlop also is producing tires for compacts made by the Big Three.

Waukesha Branch Moves

The Los Angeles branch headquarters of the Waukesha Motor Co. has moved into its new building at 5608 Soto St., Huntington, Calif. With opening of the new building, Waukesha is closing its offices in Watts, Calif. and Los Angeles.

Nortronics Adds Division

The Military Products Div. of American Radiator & Standard Sanitary Corp., Norwood, Mass., has become a part of Nortronics, a division of Northrop Corp., Beverly Hills, Calif.

ACCO Buys Company

Electro-Mech Corp., Norwood, N. J., manufacturers of control systems, has been purchased by the American Chain & Cable Co., Inc. Electro-Mech will operate as a subsidiary with Paul A. Sutton, its founder, as its president and general manager.

(Turn to page 123, please)

AUTOMOTIVE INDUSTRIES, April 15, 1960

GEARS to drive newest machines...



*produced
by*



**EFFICIENTLY,
ECONOMICALLY**

FAIRFIELD

Getting into production on new models and new machines often calls for quick action to meet desired time schedules. **FAIRFIELD CAN HELP YOU!**

As one of America's largest independent producers of **GEARS** and **DIFFERENTIALS**, Fairfield's facilities are complete. You get the benefits of newest high capacity machines coupled with regular big volume output in an ultra-modern plant designed exclusively for producing fine gears **EFFICIENTLY, ECONOMICALLY**. Check with Fairfield **NOW** on your gear requirements. *Call or write.* **FAIRFIELD MANUFACTURING CO., INC.**, 2303 S. Concord Rd., Lafayette, Indiana. Telephone 2-7353.



Gears and Differentials



Made to Order for:

TRACTORS • HEAVY DUTY TRUCKS • AGRICULTURAL MACHINERY • POWER SHOVELS AND CRANES
MINING MACHINES • ROAD GRADERS • BUSES • STREET SWEEPERS • INDUSTRIAL LIFT TRUCKS

Circle 162 on Inquiry Card for more data

113

NEED HELP WITH A HOSE CLAMP PROBLEM?



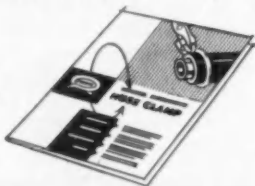
You can count on CORBIN!

Wherever you have a hose clamp problem — on your assembly line or in service — Corbin Hose Clamps will solve it! They are quality-made for trouble-free application and complaint-free service. Steels meet the industry's most rigid specifications and inspections. Quality control is continuous, thorough, exacting . . . including a testing of each load for plate thickness.

... and you get all this from CORBIN, too!

- ✓ **PROVEN PERFORMANCE** — Used by many leading manufacturers since first introduced
- ✓ **VOLUME SUPPLY** — Corbin is the world's leading hose clamp supplier — the safe source for volume users
- ✓ **SCHEDULED DELIVERIES** — Shipments systematically geared to your production schedule
- ✓ **RESERVE STOCKS** — Emergency needs are promptly met from continuously maintained reserves
- ✓ **ALL SIZES** — More standard sizes than any other maker

Write for Fact Folder HC20
and Size Specification Sheet



CORBIN HOSE CLAMP DIVISION
THE AMERICAN HARDWARE CORPORATION
NEW BRITAIN, CONNECTICUT



ON OUR WASHINGTON WIRE

The Army is going to step up its use of diesel engines while waiting for development of a general "power system" which will use a wide range of fuels. For the immediate future, the Army will use compression ignition diesel engines for most automotive equipment requiring over 150 hp. For those using smaller power plants, it will continue to use regular gasoline engines. The purpose of the move is to reduce the Army's dependence on highly-refined fuels.

Learning about space will cost us at least \$15 billion over the next 10 years. This figure could be a great deal higher, depending on our successes and whether the cost of metals, electronic equipment and labor advance sharply in the years immediately ahead. We are spending just less than \$1 billion a year at present, but this rate will climb over \$1 billion in fiscal 1962 and will continue to climb each year thereafter.

Pressure for measures requiring anti-smog devices on all autos, trucks and buses is growing. So far, the heat is for voluntary installation by makers and owners with the threat that if it isn't done voluntarily before too long, the government will force it. Secretary of Health Arthur Flemming is urging standard anti-smog devices. He rejects auto manufacturers' contention that smog is a local problem.

Within 10 years China will be as strong—or stronger—than Russia was at the start of World War II, a top State Dept. planner predicts. James W. Riddleberger, foreign-aid chief, says the Chinese Reds are beefing up both their economic and military strength at astounding rates. By 1970 they may be well ahead of the U. S. S. R. Because of this rapidly rising strength, the Eisenhower Administration is asking Congress to vote \$724 million to be spent in the next fiscal year to bolster the governments of 12 nations bordering China.

Concern over dwindling exports is resulting in new government moves to stimulate trade. The deficit in U. S. balance of international payments last year was \$3.7 billion, up \$300 million from 1958, and the gap continues to widen. The government plans to boost exports by setting up more U. S. trade centers overseas; expand trade promotion programs of the Depts. of State, Commerce and Agriculture; encourage more U. S. businessmen to go abroad and get the Export-Import Bank to guarantee some export credits and expand its borrowing capacities.



TOMORROWNESS

That's what you get today when you design with the **NEW PHENOLICS**. Here's why. You can do things with the *new* phenolics that you can't do with other materials.

Example: Cut the cost of mass-producing a water-pump impeller—and get an impeller that *doesn't corrode*.

Example: Make a fan that won't bend out of shape, can't warp, and runs whisper-quiet for years.

Example: Take the hum and drum out of heater housings and air ducts—for good.

You can get phenolics from Durez husky enough to make oil-pump gears and transmission parts that outlast metal . . . versatile enough to stand heat and vibration as a low-cost distributor bowl case. And this is only the beginning.

When you design with today's harder-working phenolics, you're almost always dollars ahead. They cost less per pound

and per cubic inch than many other materials. They're always in supply. Their price is stable. They can save you the whole cost of machining and finishing a part.

Your molder knows these materials well. He can put them to work for you—in ways you may never suspect until you discuss it with him. Let him bring you up to date soon on these versatile *plastics that take you where other plastics can't go*. Or write us directly for descriptive Bulletin D400, or for help on a specific application.

DUREZ PLASTICS DIVISION

8204 Walck Road, North Tonawanda, New York

HOOKER CHEMICAL CORPORATION



Automotive Quality Control MEN AT WORK

(Continued from page 61)

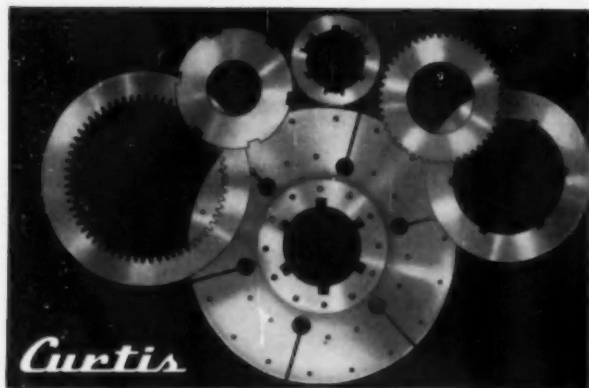
quality control in 1952. "From our experience over the past six years," he reported, "I know we have eliminated all vendor misunderstanding. We have statistical evidence on all production customer performance issued by our Quality Control section and passed on to our vendors by the Purchasing Department. Vendors are advised of each shipment rejection in detail and also advised of their accumulative performance every three months. This sounds like a lot of work and cost, but experience has shown us that the extra expense is actually the typing of the report; everything else must be done anyway to insure receiving a quality product. . . . I think all you men should drive for quality control of supply items and "vendor rating reports" should be issued on all supply

sources. This would be a big step toward eliminating the poorer suppliers and could justify Purchasing in placing business with the better sources."

Task Force Reports

The functions of Automotive Manufacturer and Supplier Manufacturer relations were analyzed in detail by a special task force of the Automotive Division, in the intermediate stages of the development of the Division annual conference programs. A "Task Force" sub-committee under John L. King of Ford Motor Co., studied these special problems and reported upon results of a survey in which more than 132 responses were received. The responses showed that 94 per cent of the companies responding thought the committee's goals were worth-

while and that the "Task Force" sub-committee was the proper organization to be working toward the solution of such problems. Firms employing 200 or more persons provided 66 per cent of the responses. It was discovered that inconsistent customer practices and lack of information concerning what is expected of suppliers in the way of quality seemed to be the main areas causing strained relations between automotive firms and their suppliers. It was interesting to discover that 84 per cent indicated that they believed that their customers quality specifications were "generally" reasonable; 3 per cent believed them "always" reasonable and the remaining 13 per cent "sometimes" reasonable. About 86 per cent indicated that they do not always have enough information (as suppliers) regarding what is expected of them by the automotive industry company. Ninety-one per cent indicated that they would like the automobile companies to publish their inspection methods, including the amount of inspec-

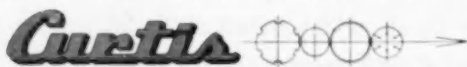


CLUTCH DISCS

closest tolerances from world's most experienced manufacturer

Designing or redesigning clutches that call for discs? Step around possible bottlenecks by contacting Curtis. Your planning can't help but benefit from the experience Curtis has stockpiled in this field since 1914.

Our unmatched production facilities and knowledge of what to do with them assure customers of on time delivery no matter how large or complex the order's requirements. Curtis 100% inspection methods hit specs right on the nose, producing fully interchangeable pieces that don't tie up customer production with selective assembly.



MANUFACTURING CO. Established in 1854
CLUTCH DISC DIVISION, DEPT. 67, St. Louis 33, Mo.

Circle 165 on Inquiry Card for more data

Quantity
PRODUCTION
of
GREY IRON CASTINGS

ONE OF THE NATION'S
LARGEST AND MOST MODERN
PRODUCTION FOUNDRIES

ESTABLISHED 1866
THE WHELAND COMPANY
FOUNDRY DIVISION

MAIN OFFICE AND MANUFACTURING PLANTS
CHATTANOOGA 2, TENNESSEE

Circle 166 on Inquiry Card for more data

tion and the ranking of relative importance of dimensions at the time bids are asked for and thereafter. Only 29 per cent had entered into Quality certification agreements with their automotive industry customer. But of those not having such agreements, 46 per cent believed that such agreements could be beneficial to them and 62 per cent said that such agreements could be beneficial to their customers.

Future Trends

Summed up, the experience of the Automotive Division seems to suggest that the following trends may be expected to continue in the industry. There will be a trend of increased continuous analysis of quality control for major automotive production parts. Such processes will be coordinated with developing end-uses of such data in design, production and purchasing. More and more attention will be paid to the cooperation of suppliers in quality control, with the automotive engineers. Each important vendor may, in time, obtain a technical "feed-back" in the form of rating reports on the quality of his own products supplied to the automotive industries. The total area of systems and methods, within both the automotive industry and its suppliers, seems headed for substantial long-term growth and expansion as a vital service to the improvement of products, profits and control of costs. The meetings of the Automotive Division have created an impressive stock-pile of special reports on some major automotive aspects of quality control, which have provided a basis for a developing professional technique, within the automobile companies. ■

Gabriel Subsidiary

Establishment of Gabriel of Canada Ltd., in Toronto as a jointly-owned Canadian company of the Gabriel Co. and Van Der Hout Associates, Inc., has been announced. Gabriel of Canada will manufacture shock absorbers and other related automotive equipment. The plant is expected to be in production in October.



Job-Designed Rivets for Every Industry

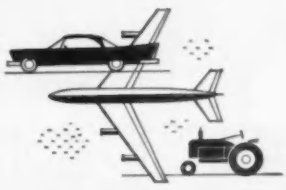


Here is a fast, dependable, low cost, quality minded source of supply for **JOB-DESIGNED** fasteners of all types, in any metal, to fit your own assembly problem. Assembly costs are a very major part of manufacturing expense. Most of this is labor. The fastening medium itself is usually a minimum item. If a Job-Designed fastener makes assembly simpler and faster, permits the use of fewer fasteners, allows the designer functional freedom and improves product efficiency, yours is a specifying job well done. All these possibilities are available when you come to Hassall for design assistance and quotation on challenging, difficult or unusual rivets, threaded nails, drive screws and other cold headed parts. Short or long runs, pilot quantities, engineering counsel, over 100 years of intimate association with cold heading—and a deep appreciation for the concept of value analysis—all are part of the Hassall service to you.

Send for a copy of our latest catalog.

JOHN HASSALL, INC.
MANUFACTURERS SINCE 1850
P. O. Box 2194 • Westbury, Long Island, N.Y.

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GROMMETS


...by the Millions

Grommets for any conceivable industrial purpose from natural, all purpose (GR-S), Neoprene and Buna-N rubbers.

Western grommets come in hundreds of standard sizes, and can be ordered in any formulation from molds already prepared.

Western Rubber is fully equipped for production of either standard or custom designed grommets in any size, shape or volume. All are quality controlled and economically produced to your specifications.

Write or phone for information or a visit by our sales engineer in your area.



WESTERN RUBBER CO.
GOSHEN 3, INDIANA

MOLDED AND LATHE-CUT RUBBER PARTS FOR ALL INDUSTRIES

Circle 168 on Inquiry Card for more data

AI QUARTERLY SURVEY...

Users Propose Standards for Machine Tools

(Continued from page 65)

have the objective of minimizing the premature obsolescence of expensive tools and fixtures, as well as the elimination of higher costs resulting from changes in their applications.

Another important item is a proposal to create a standard nomen-

clature that would establish a common identity and specific size for each machine tool, regardless of make.

Realizing that the program is one of major proportions, the group has selected just four types of general purpose tools as a be-

ginning. These comprise drilling machines, grinding machines, milling machines, and turning machines. One example will suffice for our purpose. This is the multiple-spindle drilling machine, illustrated here.

It may be noted that the user group is enlisting the cooperation not only of NMTBA, but also of the machine tool builders who are not NMTBA members. In fact, representatives of both groups were invited to the Detroit meeting.

The next step in this program is the official presentation of the proposed standardization project to the NMTBA at its spring meeting on May 5-6 in New York.

Meanwhile, each of the technical groups of the users' committee is engaged in preparing comparison sheets, grouping all makes of similar tools of the same rating to show the variance in significant features. This catalog data will make it easy to see the differences among makes, thus facilitating the discussion of features that could be readily resolved.

Although the user group has taken the initiative, it has wisely agreed that the actual development of such features as may be subject to standardization be left for the consideration of the machine tool industry. They feel that full cooperation blended with sympathetic agreement should provide the answers within a relatively short space of time.

Nor is this effort strictly in the interest of the user. It was pointed out that machine tool builders are plagued by the fact that almost every large customer has his own machine tool standards. Consequently, some machinery builders seldom make two machines exactly alike. If the users all finally agree on a uniform standard, it should result in economic benefits to the supplier as well. ■

ROCKFORD



FOR RUGGED WORK AND RUGGED QUALITY SPECIFY THE NEW ROCKFORD 'RT' CLUTCH

The tremendous power needed by this heavy "International" transit vehicle, equipped with a concrete mixer, is being supplied by a NEW ROCKFORD "RT" CLUTCH. Using the patented principles of ROCKFORD CLUTCH'S advance research, makes the NEW "RT" Clutch give far greater efficiency for a longer life span. The tremendous torque grip and power that is needed for smooth operation is always available in ROCKFORD CLUTCHES.

Specify the NEW ROCKFORD "RT" CLUTCH to achieve an even greater degree of customer satisfaction. Let ROCKFORD'S advance research help you with today's designs. SPECIFY "ROCKFORD CLUTCHES."

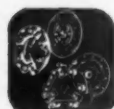
SEND FOR THIS HANDY BULLETIN
Gives dimensions, capacity tables and complete specifications. Suggests typical applications.

ROCKFORD Clutch Division BORG-WARNER

315 Catherine St., Rockford, Ill., U.S.A.

Export Sales Borg-Warner International — 36 So. Wabash, Chicago 3, Ill.

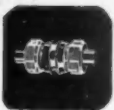
CLUTCHES



Small
Spring Loaded



Heavy Duty
Spring Loaded



Oil or Dry
Multiple Disc



Heavy Duty
Over Center



Power
Take-Offs

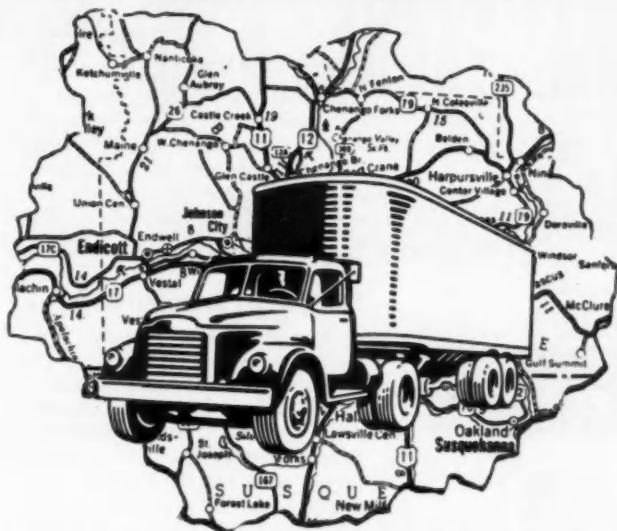


Automotive
Spring Loaded

AUTOMOTIVE INDUSTRIES...

is your News Magazine of
Automotive and Aviation
MANUFACTURING

*Do the auxiliary fuel tanks on your trucks
meet every safety requirement?*



**WHEN YOU SPECIFY SNYDER TANKS
YOU'RE ABSOLUTELY SURE THEY DO
BECAUSE ONLY SNYDER...**

- **PICKLES ALL STEEL** to remove mill scale abrasives. And Snyder vacuums and magnetically cleans each tank to ensure safe, dirt-free operation.
- **FOG SPRAYS EACH TANK'S INTERIOR** to prevent rust.
- **FLANGES ALL TANK HEADS** to give extra insurance against rupture from impact. Ribbed bottoms and bossed heads strengthen and stiffen all flat bottom tanks to better withstand road shock.
- **MACHINES TOP OF FILLER NECK** to guarantee positive gasket seating of cap eliminating fill cap leakage. Ball check vent in top of tank provides full ventage.
- **SUBMERGES EVERY TANK IN WATER** and pressurizes with air to test for and correct leaks. After this test, every tank is visually inspected before shipment.
- **MAINTAINS COMPLETE TANK RESEARCH AND TEST FACILITIES.** Snyder, pioneer in safety tank design, continues to lead the field with tanks custom engineered and designed to meet the most rigid standards, provide economical efficient fuel supply, and incorporate *all* safety features.
- **AVAILABLE IN STEEL OR ALUMINUM** No matter what make and model truck you want to fit, no matter what style and capacity tank you desire, Snyder's trained sales engineers and Engineering Department are available to assist you. And each Snyder Tank is designed, built and tested to the highest quality standard in the industry. You can rely on them.

*For safety, satisfaction and service, be sure to:
ALWAYS SPECIFY SNYDER*

**Snyder Tank
CORPORATION**

P. O. BOX 14, BUFFALO 5, N. Y.



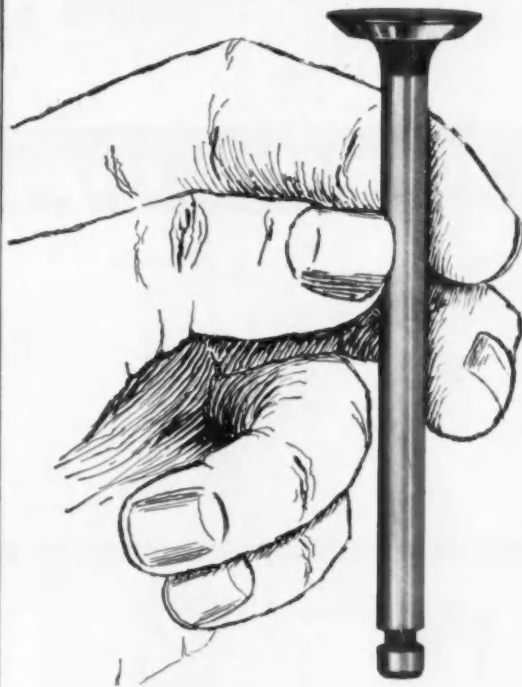
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AUTOMOTIVE INDUSTRIES, April 15, 1960

COLD-HEADED INTAKE VALVE

Lower in cost . . . better by test . . .

Engineered by NATIONAL LOCK



A leading manufacturer of lawn mower engines came to us with a challenge . . . to make a cold-headed intake valve that would cost less and outlast its forged predecessor. National Lock engineering and production specialists worked as a team. Our metallurgists tested and specified the metals that were superior in strength and free from structural defects. Production then determined the most efficient, economical methods of making the valve in volume. Results: The finished product IS low in cost, better by endurance test! AND NATIONAL LOCK IS THE FIRST MANUFACTURER TO PRODUCE COLD-HEADED INTAKE VALVES . . . another example of our engineering ability and production versatility. National Lock fasteners and cold-headed products can be designed to your specific requirements and engineered to cost you less. Write us.

QUALITY STANDARD AND SPECIAL-PURPOSE
FASTENERS AND COLD-HEADED PRODUCTS



NATIONAL LOCK COMPANY

FASTENER DIVISION

Rockford, Illinois

Circle 171 on Inquiry Card for more data

S-p-e-e-d C-h-e-c-k Tech List INDUSTRIAL ENGINES

For the items below check number listed for each item on the business reply card at back of the issue

D-C Motors

1

D-C Motors, open and totally enclosed, are described in a four page folder that contains cutaway drawings and design data. Specifications and technical information are

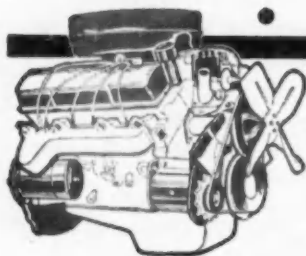
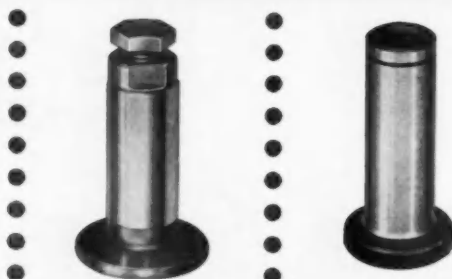
shown on a chart. *General Electric Co.*

Selection Handbook

2

Illustrations, engineering data, dimension drawings and design in-

JOHNSON *tappets*



**for all engine applications*

All of the engineering and manufacturing effort at Johnson Products goes into producing a better tappet. Continual experimentation and exacting quality control make JOHNSON TAPPETS worthy of your consideration. Only proven materials, covering a range of hardenable iron, steel, and chilled iron of various alloys, are used in JOHNSON TAPPETS. These tappets are successfully used in jobs ranging from light duty to the most severe, punishing applications. Serving all industry that employs internal combustion engines.



"tappets are our business"

JOHNSON  PRODUCTS
MUSKEGON, inc. MICHIGAN

formation are all included in a handbook that was designed for the selection of repowering engines. *Caterpillar Tractor Co.*

Engine Power

3

Cat has been a large producer in the heavy duty diesel industrial engine field for over 27 years. The operation at Cat and their various facilities are covered in this compendium. *Caterpillar Tractor Co.*

Technical Brochure

4

This publication contains complete information on each of the new units in Haydon's stepper motors and pulsed stepping devices. Well illustrated, the booklet contains schematic drawings of application circuitry as well as pulse profiles. *A. W. Haydon Co.*

Design Catalog

5

Engines, components, their specifications and technical information are all included in a colorful and well illustrated booklet. Diesel engine data for power, price and fuel economy are shown. In addition, there are charts for comparison with other makes of diesel engines. *International Harvester Co.*

Diesel Plants

6

New 2000, 5000 and 7500 watt diesel electric plants that were engineered for industrial applications are discussed in a nicely illustrated booklet. Fuel economy, model specifications and technical information are included. *Kohler Co.*

Specification Data

7

Heavy duty air cooled engines that use liquefied petroleum gas as a fuel are described and illustrated in a four page booklet. Included is data on operating benefits and how liquefied gas is employed as a fuel. *Wisconsin Motor Corp.*

Engine Catalog

8

Specification data for electric sets is shown in chart style in a booklet that covers a complete line of modern power plants. These charts cover: model; electric set ratings—continuous KW—standby KW; weight; hp; rpm; gear ratio and dimensions. *Caterpillar Tractor Co.*

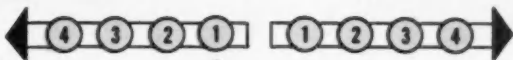
(Continued on page 122)

**only
the**

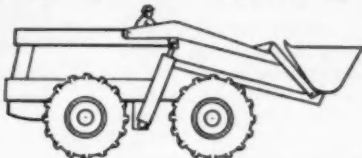
HYDRA-DRIVES® BDB

OFFERS ALL THESE MAJOR ADVANTAGES

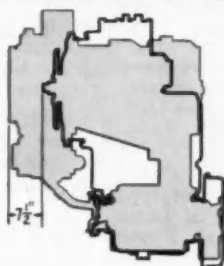
IN FULL-POWER SHIFT TRANSMISSIONS
for equipment from 60 to 175 h.p.



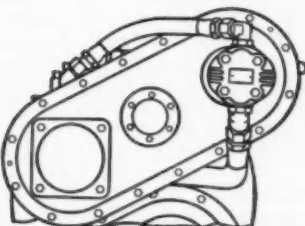
1. 4 speeds forward and reverse. All power shifted! Provides maximum horsepower to load under all load conditions.



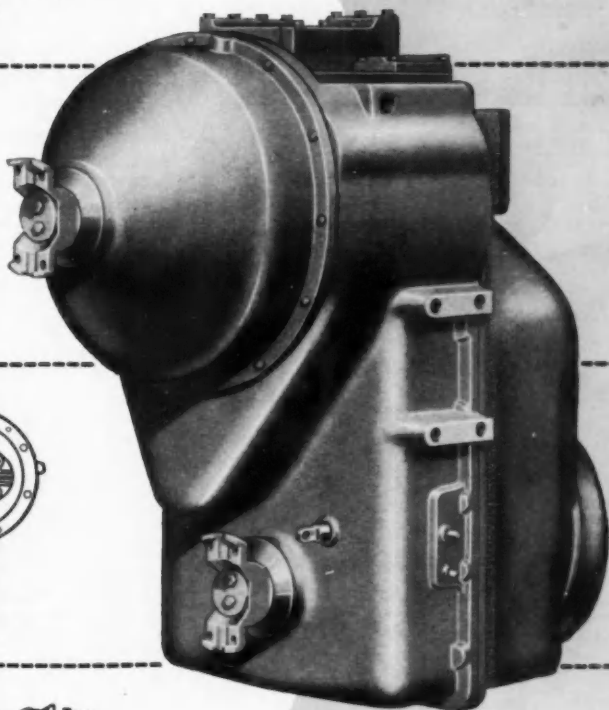
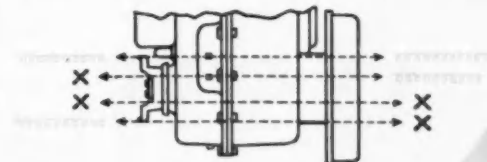
2. Integral design. Torque converter, transmission, oil passages, valving and oil sump are in *one* compact housing—7½" shorter than comparable models.



3. Triple pump drives—Allow implement and steering booster pumps to be installed close to the oil reservoir. Installation and maintenance costs are reduced. Single pump drive is also available.



4. Full disconnect provides four combinations of split drive . . . from torque on both shafts, to both shafts in disconnect.



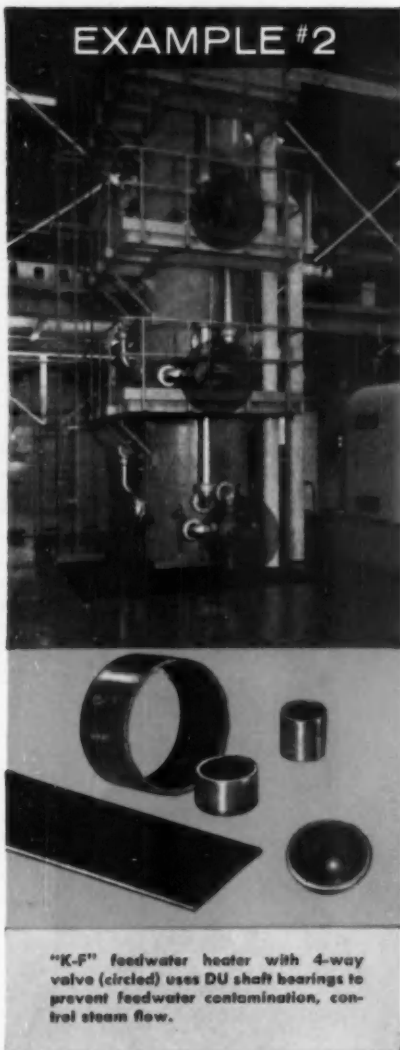
SPECIALLY DESIGNED FOR SMALLER INSTALLATIONS

Rockwell-Standard's new model Hydra-Drives Full Power Shift Transmission is now available in sizes especially designed for smaller installations, such as front end loaders, fork trucks, scrapers, crane carriers, rubber tire tractors and military vehicles.

In addition, the Hydra-Drives BDB offers easier servicing and maintenance. There are fewer moving parts and bearings. The simple, rugged countershaft design, and spur gears simplify maintenance.



EXAMPLE #2



"K-F" feedwater heater with 4-way valve (circled) uses DU shaft bearings to prevent feedwater contamination, control steam flow.

DU* DRY BEARINGS Solve Another Problem

"Only DU material was successful in our new 4-Way Plug Valve Shaft Bearings after four or five of the more conventional bearing materials failed to pass acceptance tests."

J. B. Stevens, Mgr.
Valve Sales & Engineering
Schutte & Koerting

Four-way valves with DU bearings were used in an entirely new approach to a boiler feedwater heating system developed by the Kuljian Corp., applied by Cochrane Corp., and now installed in prototype unit at the Borough of Lansdale (Pa.) Municipal Power Plant. DU bearings contributed to reported appreciable savings per kw installed capacity by elimination of feedwater contamination, reduction of bypass leakage and resistance to the 400°F operating temperatures.

DU metal is an ideal bearing material for many applications. It withstands much higher velocities, runs much cooler at lower speeds than other unlubricated bearings . . . has a compressive strength of 51,000 p.s.i. DU metal is applied without the need for temperature-limiting adhesives . . . will withstand from -328°F to +536°F.

GARLOCK

Apply DU dry bearings to appliances, automobiles, aircraft, farm and industrial machinery, office equipment. Standard bushings and thrust washers available for 1/4" to 2" shafts; strip available for special fabrication. Write for engineering catalog DU-458. *Special Products Dept.*, United States Gasket Company, Plastics Division of The Garlock Packing Company, Camden 1, New Jersey.

*Trademark, Glacier Metal Company Ltd.



S-p-e-e-d C-h-e-c-k

Tech List INDUSTRIAL ENGINES

(Continued from page 120)

Unitized Motors 9

Advantages, applications, features and illustrations all cover a line of unitized fractional horsepower motors. *General Electric Co.*

Engineering Catalog 10

Wet sleeve, high output, short stroke, valve in head engines are discussed in a 16 page publication. Construction details and engineering information are included. *Diamond T Motor Truck Co.*

Power Rating Charts 11

Charts covering various industrial engines are given in a folder to show the statistical information a design engineer would need to make a selection for a specific application. *International Harvester Co.*

Air Cooled Engines 12

Complete specifications are shown for a line of gasoline driven, air cooled industrial engines. Components, economy and operating features are included. *D. W. Onan and Sons Inc.*

Liquid Gas Engines 13

Charts on different models of industrial engines are shown in a booklet that describes their operating characteristics. Numerous illustrations are shown along with performance information. *Wisconsin Motor Co.*

Industrial Power 14

Illustrations of complete units, and components of these units are shown in a catalog designed to show the quality of the power plants. Included is technical data and general information. *Allis-Chalmers Mfg. Co.*

Electric Plants 15

A folder lists gasoline-engine-driven electric generating plants in both air and water cooled. It was designed to aid in the selection of power plants for certain applications. *D. W. Onan and Sons Inc.*

Manufacturers' News

(Continued from page 113)

J & L Profits Rise

Increased steel shipments to the automotive industry helped to boost Jones & Laughlin Steel Corp.'s sales to \$762.6 million despite the 116-day steel strike last year. In 1958, net sales totaled \$654 million. Net income in 1959 was \$29.4 million while the previous year it was \$23.1 million. The 1959 income was equal to \$3.58 a share. In 1958 this figure was \$2.79. Last year, 26 per cent of J & L shipments went to the auto industry while in 1958 the figure was 21 per cent.

INCO Profits Doubled

Recovering swiftly last year, International Nickel Co. of Canada, Ltd., experienced one of the best years in its history with sales of 317 million lbs. of nickel, more than INCO ever shipped before. Net earnings were \$85.1 million, more than double the \$39.6 million earned in the previous year. Dividends last year totaled \$3 while net earnings per share in 1959 were \$5.83 as compared with \$2.71 in 1958. Capital expenditures last year amounted to \$66.9 million, more than two-thirds of which was spent on nickel mines and factory at Thompson, Manitoba.

Victor Gasket's 50th Year

Victor Mfg. & Gasket Co., one of the world's largest automotive oil seal and gasket makers, is marking its 50th year. John H. Victor and his brother, Joseph, started the company in 1909 in the basement of a Chicago apartment house. George E. Victor, son of John H. Victor, has been president since 1948. His uncle is still active in the company as vice president.

Record Sales Possible

Record sales in 1960 appear possible, Robert C. Becherer, president of Link-Belt Co., has told stockholders. In 1959, the company's sales of \$152.5 were seven per cent higher than the \$141.7 of 1958. Earnings of \$6.8 million were equal to \$3.65 a share in 1959 as compared with \$6.6 million and \$3.52 a share in the previous year.

U. S. Steel Income Down

The long steel strike held U. S. Steel Corp. income to \$254.5 million last year as compared with \$301.5 million in 1958. This was equal to \$4.25 a share in 1959 as compared with \$5.13 the previous year. Sales last year totaled \$3,643 million, compared with \$3,472.1 million in 1958. Last year U. S. Steel produced 24.4 million tons of ingots and castings.

Libbey-Owens-Ford Record

All-time record sales of \$306.7 million were reported for 1959 by Libbey-Owens-Ford Glass Co. to reverse a three-year downward trend. Net earnings were equal to \$5.13 a share as compared with \$2.10 for 1958. John D. Biggers, chairman, told stockholders automotive safety glass facilities were enlarged at Rossford, O.

AUTOMOTIVE INDUSTRIES, April 15, 1960

FOR CUSTOM
COMPOUNDED
PRECISION
FABRICATED

Go Goshen RUBBER

PARTS
SEALS
PRODUCTS

O-RINGS

**TO
MEET
ADVANCED
REQUIREMENTS**

Capitalize on Goshen's experience in serving the needs of hundreds of large and small users of o-rings in the United States and Canada. Precise control of quality thru every stage of formulation and manufacture is the key to an outstanding record of sealing success.

GRC o-rings in all standard AN, MS, SAE and JIC sizes, in many non-standard sizes and in special sizes, are available from established and proven synthetic and silicone specification compounds. Go Goshen for efficient sealing under most any given conditions.





Ask for your free copy of 16-page O-ring Brochure on size, groove dimensions, compounds and other helpful information.

Goshen Rubber Co., INC.

2740 S. TENTH ST. GOSHEN, IND.

Circle 175 on Inquiry Card for more data

SAE National Production Meeting

(Continued from page 102)

probably be equivalent to the C-5 grade of carbide, which is roughly two to two and one-half times faster than the 1841 type of HSS.

Titanium carbides are the third trend. Originally the material contained about 30 per cent TiC, and more recently the TiC content was increased to 64 per cent. The latter has permitted speeds of 1000 sfm, and given greater impact strength, along with wear resistance rela-

tively consistent and equal to the ceramics, the speaker stated. The most recent development, announced last year, consists of material containing about 80 per cent TiC, with the balance made up of molybdenum and nickel—representing an even further improvement in tool life. The speaker added that on impact strength, the titanium carbides bridge the gap between tungsten carbides and ceramics. ■

NEWS OF THE MACHINERY INDUSTRIES

(Continued from page 82)

On Thursday, May 5, the general session will be concerned mainly with developments in the field of machine tool standardization. At this session, R. L. Witsche of International Harvester Co., chairman of the Coordinating Committee, Users General Purpose Machine Tool Standardization Group, together with about six other members of the Group, will explain and discuss the users' proposals for general-purpose-machine standards

(see page 65 of this issue).

Guest speaker at the banquet, slated for Thursday evening, will be Lewis Cotlow, past president of the Adventurers' Club.

Inasmuch as this meeting will be the last Association get-together before The Machine Tool Exposition-1960 (scheduled for Sept. 6-16 at Chicago), the entire general session on Friday, May 6, will be centered on what is expected to be the most-informative pre-exposi-

tion discussion the Association has ever programmed.

Around the Industry

Pratt & Whitney Co., Inc.—has announced plans to make two of its product lines — cutting tools and conventional gages — available in the near future through industrial distributors. This program represents the first departure from direct selling in the company's long history. George Steinmetz, newly appointed manager of industrial distribution, will head the project. He will welcome inquiries from interested distributors.

New Britain Machine Co.—Julian C. Pease, president, told stockholders at annual meeting on March 29 that "the Year 1959 closed with an upward trend in general business," and that "incoming machine tool orders have increased the company's backlog over a year ago." On April 1, Robert T. Frisbie, Jr., executive vice-president, reported that the company's main plant in New Britain, Conn., was returning to normal production following settlement of a strike which idled it for nine weeks.

Cross Co.—Water R. Opel has been appointed chief engineer.

National Acme Co.—Stanley E. Casson has been elected vice-president of sales.

Michigan Machine & Broach Co.—has appointed The Ray W. Pratt Co. of Cincinnati, O., as exclusive sales agency in southwestern Ohio.

Drillunit, Inc.—G. Ed Trevaskis has joined the company as sales manager.



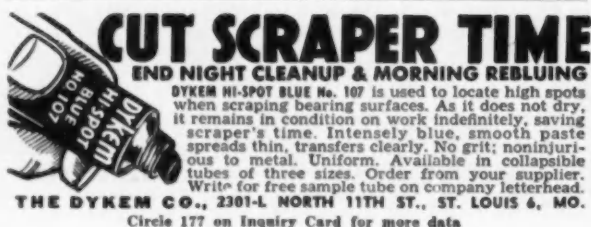
DYKEM STEEL BLUE
Stops Losses making Dies and Templates

Popular package is 8-oz. can fitted with Bakelite cap holding soft-hair brush for applying right at bench; metal surface ready for layout in a few minutes. The dark blue background makes the scribed lines show up in sharp relief, prevents metal glare. Increases efficiency and accuracy.

Write for sample on company letterhead

THE DYKEM COMPANY
2301L North 11th St. • St. Louis 6, Mo.

Circle 176 on Inquiry Card for more data



CUT SCRAPER TIME
END NIGHT CLEANUP & MORNING REBLUING

DYKEM HI-SPOT BLUE No. 107 is used to locate high spots when scraping bearing surfaces. As it does not dry, it remains in condition on work indefinitely, saving scraper's time. Intensely blue, smooth paste spreads thin, transfers clearly. No grit; noninjurious to metal. Uniform. Available in collapsible tubes of three sizes. Order from your supplier. Write for free sample tube on company letterhead.

THE DYKEM CO., 2301-L NORTH 11TH ST., ST. LOUIS 6, MO.

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BUY
BONDS



ADJUSTABLE WALL-THICKNESS BUSHINGS
PROVIDE PRECISE CYLINDRICAL FITS WITHOUT CLOSE TOLERANCE MACHINING.

NEW!!!

PROVIDES TIGHT FITS equivalent to press or shrink fits.

PROVIDES PRECISE CLEARANCE FITS as required for plain bearings, hinge pins, pivot pins, etc.

AVAILABLE in many different sizes and materials.

SEND FOR ILLUSTRATED LITERATURE

ADJUSTABLE BUSHING COMPANY
12036 VOSE STREET • NORTH HOLLYWOOD, CALIFORNIA
POlar 5-7590 - TRiangle 7-6007

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AROUND THE CLOCK **CLECO** AROUND THE WORLD AIR TOOLS



**Going to the
ASTE Show?
Visit Booth No. 526
to see what's new
in air tools!**

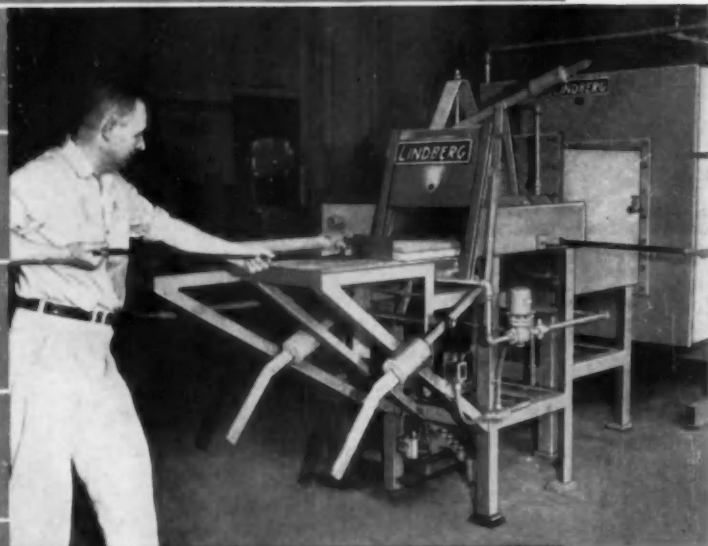
A Division of REED ROLLER BIT COMPANY
P.O. Box 2119 • Houston 1, Texas
Cleco Pneumatic Tool Company of Canada, Ltd.
927 Millwood Road, Leaside (Toronto), Ontario

Visit Booth No. 526! Examine and try-out Cleco's new line of automatic-accuracy-torque-control tools, drills, screwdrivers, nut-runners, impact wrenches, grinders, and nutsetters . . . the air tools that make possible quality control. While you're there get the answer to your specific air tool problem—torque control, production lag, tool maintenance, quality control, air waste, high parts inventory—by discussing them with one of Cleco's air tool specialists.

If you want to take home money-saving ideas, if you want to see what's new in air tools—**VISIT CLECO® AT THE ASTE SHOW . . . BOOTH NO. 526!** (Several quality control tools with new, exclusive features will make their public debut at the show.)

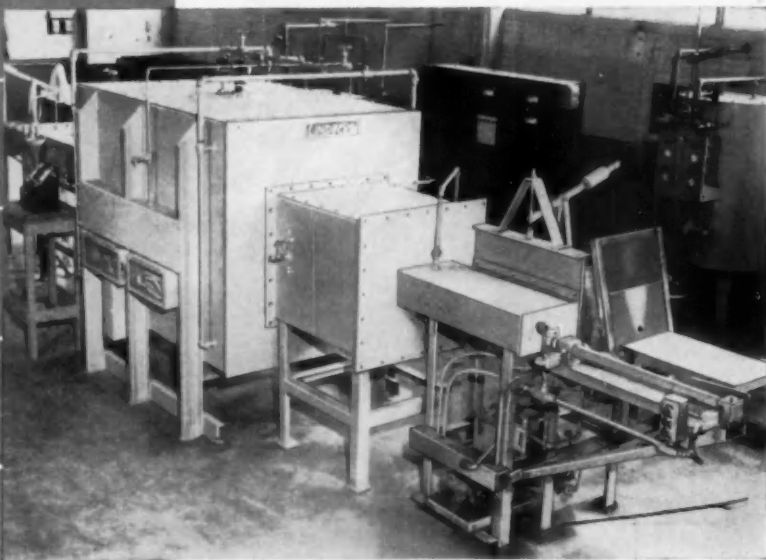
NEW LINDBERG FURNACE PROVIDES IMPROVED EFFICIENCY FOR STAINLESS STEEL SINTERING

This Molybdenum Element Atmosphere Pusher Type Furnace embodies high temperature refractories suitable for low dew point without muffle



This new furnace provides an improved method for sintering stainless steel compacts in hydrogen or dissociated ammonia. A development of Lindberg's engineering staff, you can depend on the most efficient, economical and trouble-free service from it. Furnace provides side loading and discharge parts with purging chambers. Work trays, ceramic slabs or molybdenum boats, move through the furnace by hydraulic pusher. In the installation illustrated below ammonia dissociator and control panels are shown at the right. Hydrogen supply cylinders are located outside the building. For full information on this and Lindberg's complete line of sintering and brazing furnaces just get in touch with your local Lindberg Field Representative (see classified phone book) or write us direct. Lindberg Engineering Company, 2491 West Hubbard Street, Chicago 12, Illinois.

Type MOP-12307-A66C Molybdenum Element Atmosphere Pusher Furnace. Maximum Temperature 3000° F. 60 KW input. 12" wide, 36" long, 7" high. 60" cooling chamber, 36" long preheat chamber.

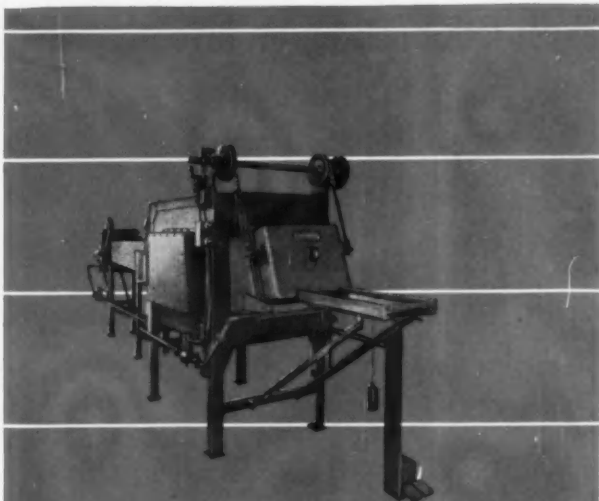


LINDBERG heat for industry

As it does in all types of industrial heating equipment, Lindberg provides a complete line of sintering and brazing furnaces. For example:

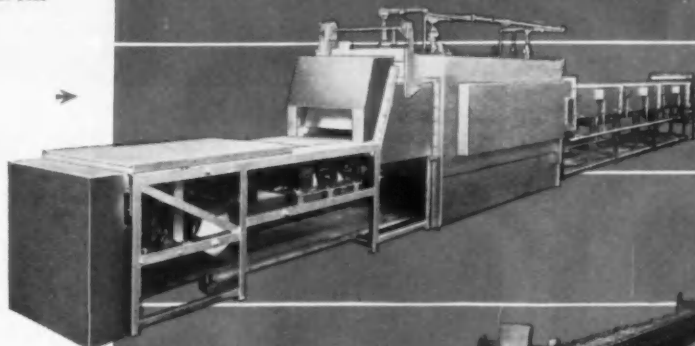
This Hand Pusher Batch Type Furnace ➔

is used for small production lots and experimental sintering. It is an all-purpose unit for operation from 1300°F to 2500°F. Made in various sizes for sintering from 25 to 300 pounds per hour.



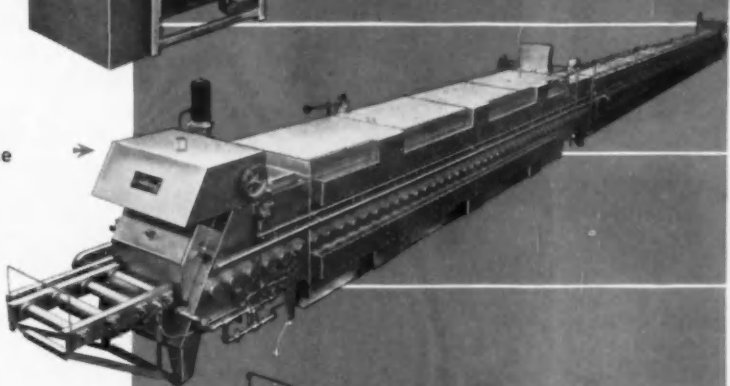
This Mesh Belt Continuous Type Furnace ➔

is a popular sintering furnace for small light parts in copper, bronze, brass or steel with a temperature range from 1300°F. to 2100°F. It can be used for low temperature silver brazing, bright annealing, as well as sintering of powder metals. Production ranges up to 500 pounds per hour.



This Roller Hearth Continuous Type Furnace ➔

is especially designed to handle heavier loads up to 2200 pounds per hour. It has an effective temperature range from 1300°F. to 2100°F. It can be used for bright annealing, low temperature silver brazing as well as sintering of powder metals.



Atmosphere Generators ➔

To obtain the best work from any sintering furnaces, the proper atmosphere is required. The atmosphere generators described here provide the proper atmospheres recommended for use with Lindberg Sintering Furnaces.

If you have a sintering or brazing problem why not talk it over with Lindberg. Just get in touch with your nearest Lindberg Field Representative or write us direct.

LINDBERG

ENGINEERING COMPANY

2491 West Hubbard Street, Chicago 12, Illinois

Los Angeles Plant: 11937 S. Regentview Ave., at Downey, Cal.

In Canada: Birleco-Lindberg, Ltd., Toronto

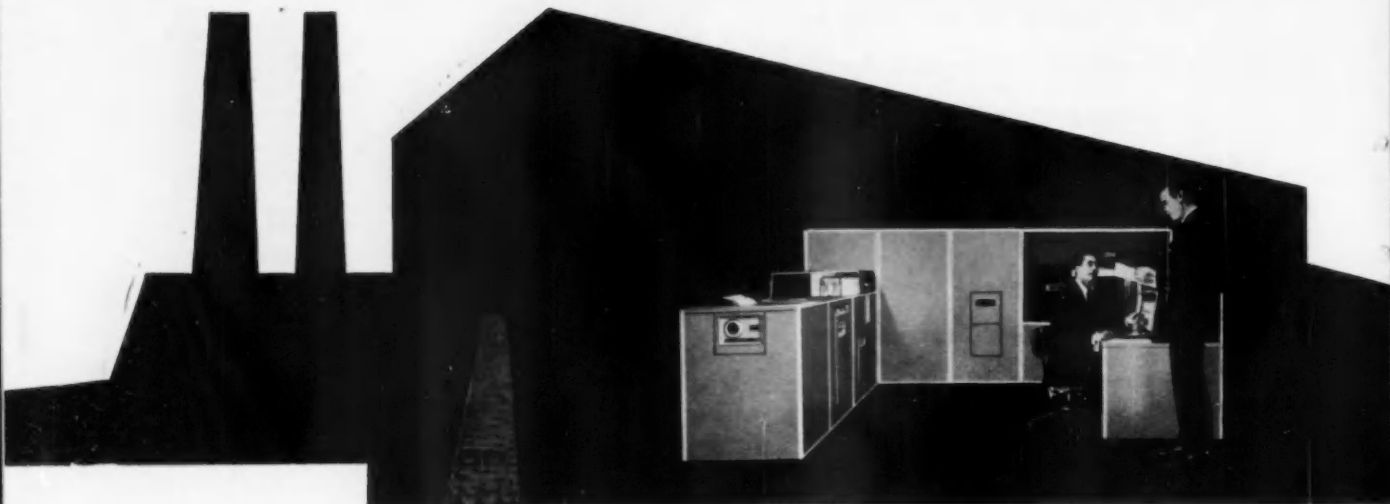


1. The HYEX Generator produces atmosphere composed of approximately 4% carbon dioxide—10% hydrogen—12% carbon monoxide and 76% nitrogen.

2. The HYEN Generator produces a neutral atmosphere composed of approximately 21% carbon monoxide—40% hydrogen—39% nitrogen and 1% methane.

3. The HYAM Generator produces atmosphere composed of approximately 75% hydrogen and 25% nitrogen.

one late decision on inventory and this \$50 part* could cost you \$5,000



IBM RAMAC® 305 controls inventory data to prevent costly "out-of-stock" conditions

A delay in production caused by an "out-of-stock" part can make that part the most expensive item in your stock. IBM RAMAC 305 gives you the fast and accurate control over inventory that helps you avoid costly shortages—or equally costly overstocking.

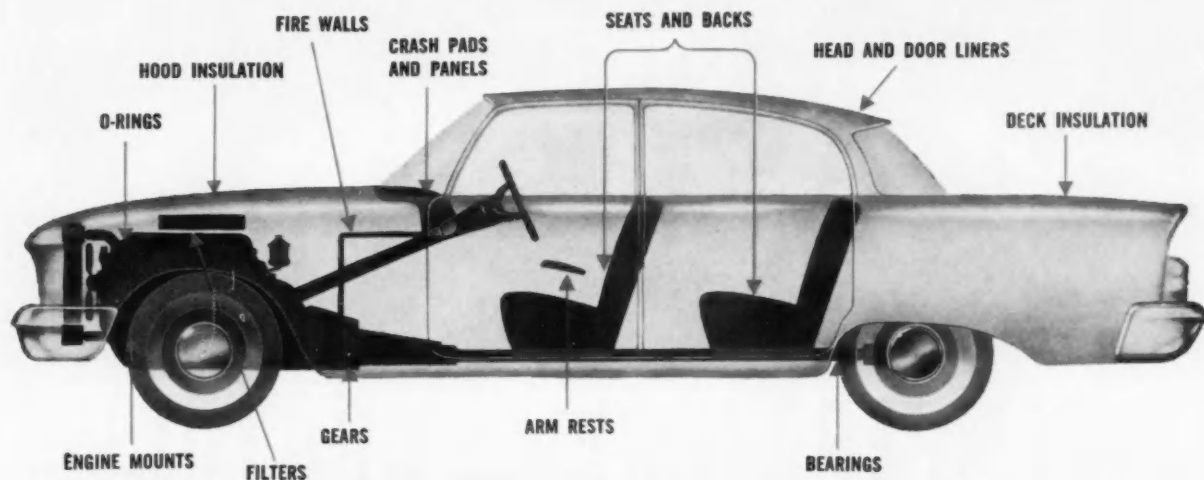
As each transaction is entered into RAMAC, all affected records are immediately posted and updated. Management may inquire as to the status of any specified item in inventory. This random access ability is an exclusive feature of the IBM RAMAC.

Balanced Data Processing . . . IBM services as well as machines . . . is a continuing responsibility of IBM to its customers. Like all IBM data processing equipment, RAMAC 305 may be purchased or leased.

IBM
balanced data processing

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STAFOAM* and DAYCOLLAN*



offer unique solutions to automotive problems

The unique combination of properties of Stafoam and Daycollan, improved urethanes, help solve many problems in automotive design. Seating, liners, insulation, mounts, fire wall, filters, gears, bearings and O-rings are but a few of their applications. In each case components made of these miracle materials make possible more efficient design and operation, increased reliability and reduced costs.

Stafoam, pre-formed or foamed-in-place in flexible or rigid types, has excellent thermal and acoustical qualities. Fire, oil and fungus resistant, it has good tensile, compression and shear strength. Easily fabricated, it

can be cut, sliced, heat sealed, sewn, die cut or molded into the most intricate shapes.

Daycollan urethane elastomers are custom made to specification for molded mechanical components. They have the common properties of high energy absorption, exceptional shore hardness, tear strength and abrasion resistance.

It will pay you to investigate the multiple advantages implicit in the simplified design, longer life and greater reliability of components made of Stafoam and Daycollan. For complete information call or write Dayco Urethane Div., Dayco Corporation, Dayton 1, Ohio.

*Registered Trade Mark

Daycollan®

Made by DAYCO URETHANE, Dayton, Ohio

and AMERICAN LATEX PRODUCTS CORPORATION, Hawthorne, California

Divisions of Dayco Corporation (formerly Dayton Rubber)



HEADQUARTERS FOR NEW IDEAS



TEMPERATURE CONTROL

*... an Important Factor
in Spring Performance*

Heating the special alloy bars from which Burton Springs are made is an important operation that must be done right to insure correct spring performance.

This control panel, one of several at the Burton plant, governs and records furnace temperature by automatic pyrometers located inside the furnaces.

Spring quality is affected by the way in which these furnaces are operated and how their operation is supervised. Here, as in every step of manufacturing, Burton Springs receive the utmost care.

America's leading manufacturer of motor transport and off-highway equipment have their springs made in the Burton factory, because they know the care that goes into making Burton Springs assures the utmost dependability.

Bring your next spring problem to Burton engineers.

BURTON SPRINGS

VITAL SUPPORT FOR THE AUTOMOTIVE INDUSTRY



BURTON AUTO SPRING CORPORATION, WESTERN AVENUE AT FORTY-EIGHTH STREET, CHICAGO 32, ILLINOIS



Maybe your contact assemblies cost too much

Both price and performance of electrical contact assemblies depend on how the contact material is joined to its backing member. When Mallory produces your complete contact assembly, you are assured of top performance . . . plus the economic advantages inherent in Mallory's specialized production techniques and equipment.

Through decades of specialization and research in electrical contacts, we have developed unique methods of working with contact materials. We have the most up-to-date equipment available for producing assemblies—including special multi-slide machines for maximum economy in large production runs.

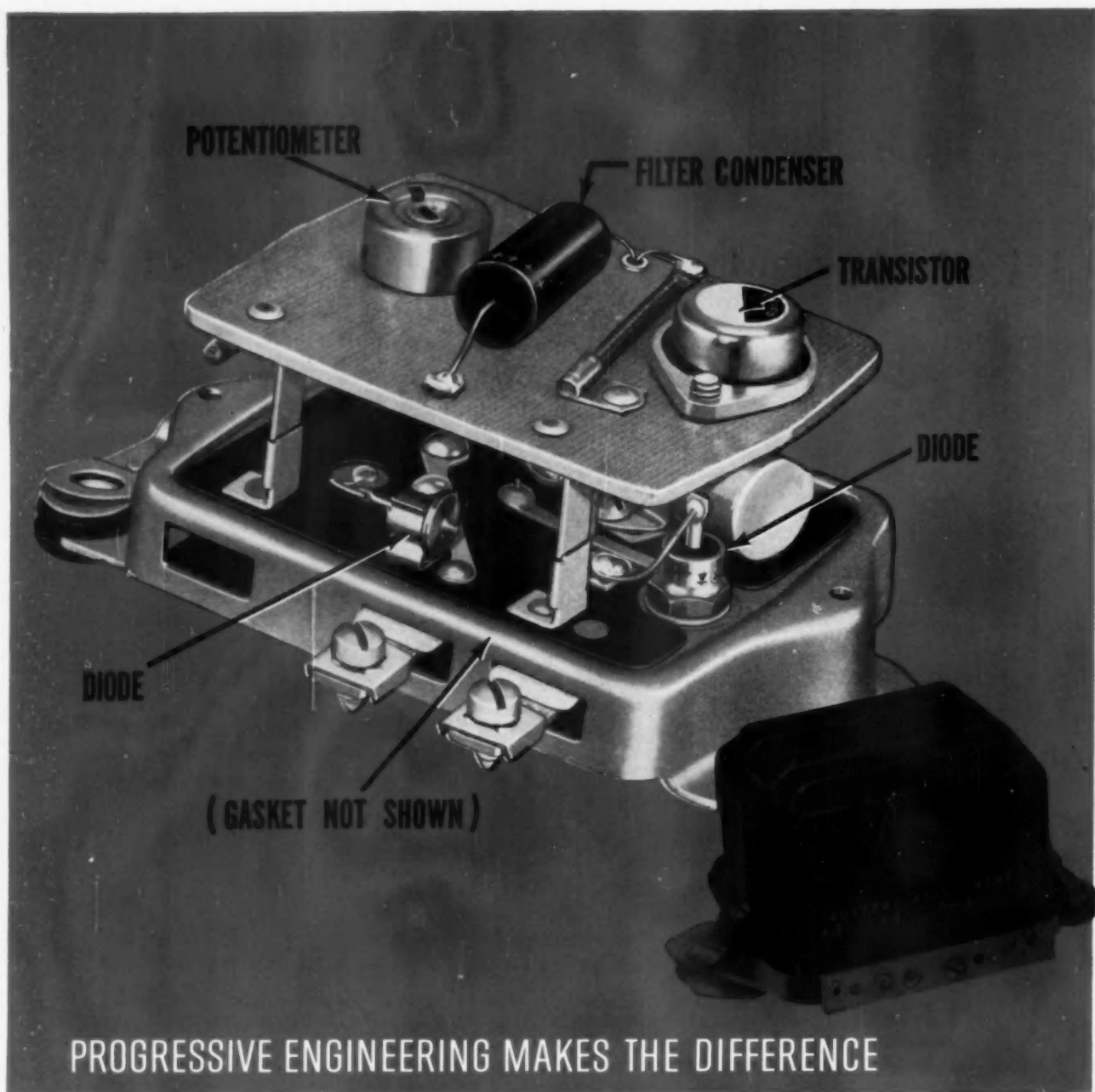
Mallory contact engineers can save you time, money and trouble by providing the assembly method best suited to your particular application—whether it's by mechanical means such as riveting, hot upsetting or spinning . . . or by

using one of the unusual methods we have developed for welding or cast-on assembly . . . or through applying one of our various brazing methods. We'll adapt your design to the most economical assembly method. You'll find buying assemblies from Mallory pays off in simplified purchasing and scheduling, and the best contact life at lowest cost. Write or call today for a consultation.

Mallory Metallurgical Company
Indianapolis 6, Indiana

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MALLORY



PROGRESSIVE ENGINEERING MAKES THE DIFFERENCE

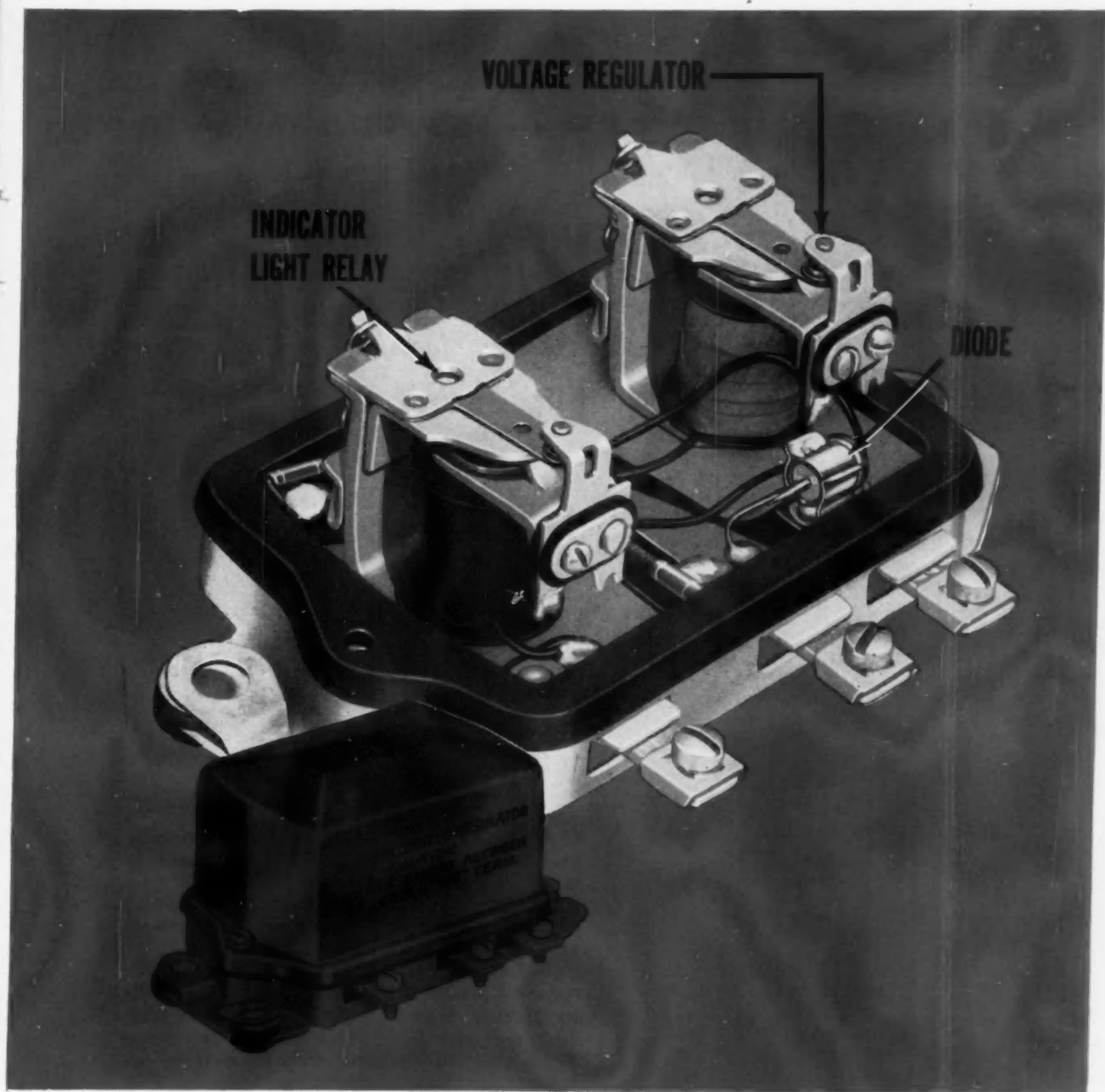
ONLY DELCO-REMY OFFERS FULL-TRANSISTOR

***Designed for use with
DELCO-REMY'S new self-
rectifying a.c. generators***

Now you can choose between *two* modern new Delco-Remy regulators—the most accurate available today. One is a full-transistor model, the other transistorized.

The **FULL-TRANSISTOR REGULATOR** has no moving parts and offers the ultimate in accurate electrical performance, durability and reliability. It is composed entirely of transistors, diodes, condensers and resistors, permitting higher field current for better generator performance. Constant voltage control is unaffected by temperature changes, vibration, or mounting position. A simplified external adjusting feature permits easy voltage setting for varying operating conditions. And this full-transistor regulator requires no periodic servicing.

The **TRANSISTORIZED REGULATOR** contains a single transistor and diode working in conjunction with a vibrating-type voltage sensing unit. The transistorized circuit



AND TRANSISTORIZED VOLTAGE REGULATORS

permits high field current for improved generator performance with low non-inductive current through the contacts for greatly extended contact life. Models are available for circuits containing either ammeters or indicator lights. All units are temperature compensated to better match battery voltage requirements.

Both the full-transistor and the transistorized models have the same mounting dimensions as standard regulators.

Whichever model you choose for your new vehicles or for replacement on present ones, you can be sure of reduced servicing and extended battery life. Available from your car or truck dealer or through the United Motors System.

AUTOMOTIVE INDUSTRIES, April 15, 1960

FROM THE HIGHWAY TO THE STARS

Delco-Remy

ELECTRICAL SYSTEMS



DELCO-REMY • DIVISION OF GENERAL MOTORS • ANDERSON, INDIANA

Circle 185 on Inquiry Card for more data

It's new....

It's here...

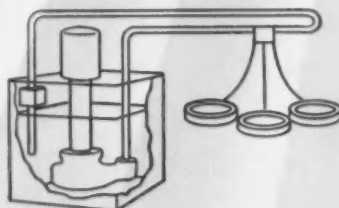
It's the **NEW LAPMASTER**

FEATURING:

*✓ Automatic Control of Lap Plate
Flatness*



*✓ New Abrasive Distribution
System*



The completely new Lapmaster gives you automatic lap plate flatness control... PLUS... the ultimate in abrasive handling efficiency with a brand new compound distribution system... new, compact design... larger, wrap around work table to facilitate loading and unloading.

Automatic sensing head detects errors in lap plate flatness within one light band... automatically shifts conditioning rings to compensate... assures absolutely uniform lapped surfaces from the first piece to the last, without operators' attention and... eliminates human error and rejects.

New abrasive dispensing system keeps mixture of lapping compound and vehicle consistent... assures uniform distribution... equal rate of stock removal of all parts... adjustable flow control... no clogging.

See the New Lapmaster in Operation at Booth 420,
ASTE Show, Detroit, April 21-28

... get all the facts on this
spectacular new machine... and ask for
our new catalog covering all other
Lapmaster models.

A product of
Crane Packing Company
6435 Oakton Street, Morton Grove, Illinois

In Canada: Crane Packing Company, Ltd., Hamilton, Ont.



Lapmaster
... THE
MACHINE THAT PUT
PRECISION LAPPING ON A
PRODUCTION BASIS

**OUT FRONT IN PAYLOAD
AND PERFORMANCE...**

TIMKEN-DETROIT® F-900 SERIES FRONT AXLES

They're built to take it—designed for greater front end stability, greater safety, greater maneuverability, longer vehicle life! Timken-Detroit Front Axles give greater strength with no additional weight. They're the world's most complete line of front axles, with capacities ranging from 3,750 pounds to 40,000 pounds. For better up-front performance on any size truck or bus, specify Timken-Detroit F-900 Series Front Axles. You get all these advantages of superior design:

Less stress on steering arms.

As a result of special cross section and uniform design, stresses imposed by steering are distributed uniformly without concentration at any one point.

Improved steering knuckles. Deflection is held to a minimum by large knuckle spindles and improved design of knuckle section between spindle and upper and lower bosses.

Stronger axle centers. "Equalized-I" section between spring pads strengthens construction. The reverse Elliott design makes this axle center ideal for maximum resistance to deflection under load and during braking.

Simple maintenance. Rugged construction and simplified design make maintenance easier, less costly. Location of lubrication points makes lubrication faster and easier.

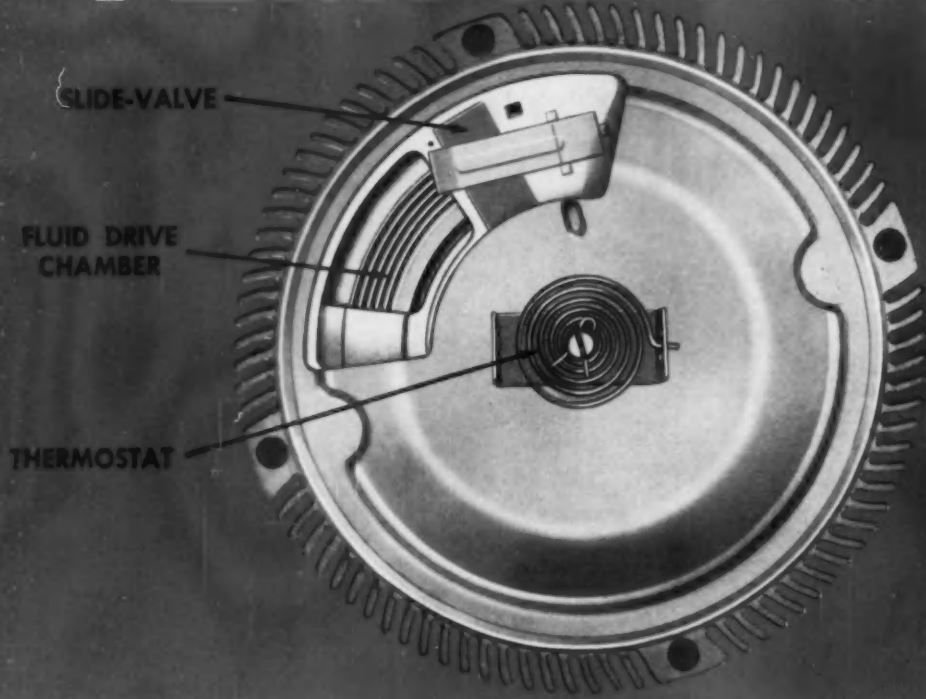
Another Product of...

ROCKWELL-STANDARD
CORPORATION



Transmission and Axle Division, Detroit 32, Michigan

EATON TEMPATROL



Temperature Regulated Fan Drive Increases Usable HP— Reduces Fan Noise

HOW TEMPATROL WORKS: When under-hood temperature is below the thermostat setting, slide-valve is closed; fluid-drive chamber is empty; the fan idles.

With a rise in under-hood temperature above the thermostat setting, slide-valve opens; fluid enters viscous drive chamber, increasing fan rpm to a pre-determined limit for adequate cooling.

- When cooling is not required, the thermostatic unit causes the fan to idle, thereby increasing net engine output.
- With the Tempatrol Drive engaged, adequate cooling can be achieved at low engine speeds. The top fan speed is controlled to a pre-determined maximum to avoid excessive noise.
- Operational ranges can be established to suit the requirements of each vehicle.

Eaton Tempatrol Fan Drives are readily adaptable to existing installations with only minor changes. They are now operating efficiently on leading motor vehicles. Consult with our engineers on your fan drive needs.



TORQATROL is the torque-regulated version of the Eaton Viscous Fan Drive (without thermostatic control). At low engine rpm, the fan operates at driven speeds. As engine speed increases, the viscous drive slips, limiting the maximum fan speed. Maximum fan speed limit can be raised or lowered to suit the needs of specific installations.



Tempatrol and Torqatrol are fan drive units in the family of Eaton Visco-Drives.

EATON

PUMP DIVISION
MANUFACTURING COMPANY
9771 FRENCH ROAD • DETROIT 13, MICHIGAN

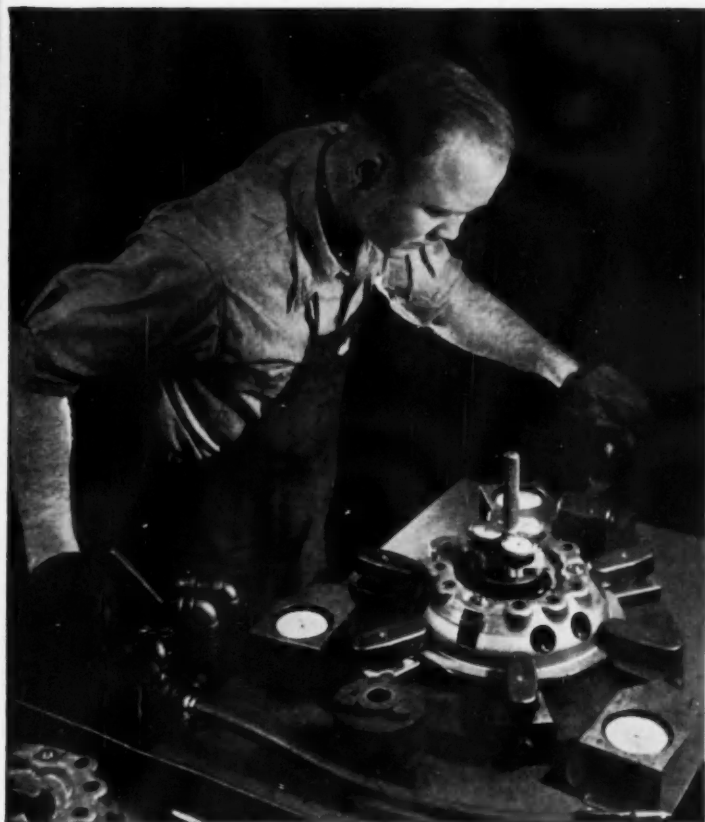
Quality Control is a BORG & BECK tradition that means

BETTER CLUTCHES

At Borg & Beck, quality control is not just a phrase to which we pay lip service. It is a tradition born of the long-standing Borg & Beck policy of building up to a standard—not down to a price.

In the photograph at the left, for example, release levers are being checked on special equipment to make sure they are parallel with the pressure plate. As shown at the right, every Borg & Beck clutch plate is carefully tested for correct deflection to assure positive release. And every driven plate and cover assembly is dynamically balanced for maximum smoothness of operation.

These exacting tests are typical of the extra care that goes into every step in the making of Borg & Beck clutches. They are your assurance of top quality, top performance, top value. And that means: **BETTER CLUTCHES.**



BORG & BECK®

THE AUTOMOTIVE STANDARD FOR MORE THAN 40 YEARS

BORG & BECK DIVISION, BORG-WARNER CORPORATION, CHICAGO 38, ILLINOIS

Export Sales: Borg-Warner International, 36 S. Wabash, Chicago 3

AUTOMOTIVE INDUSTRIES, April 15, 1960

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Presenting...

A rugged, dependable new shaft seal for a broad variety of applications

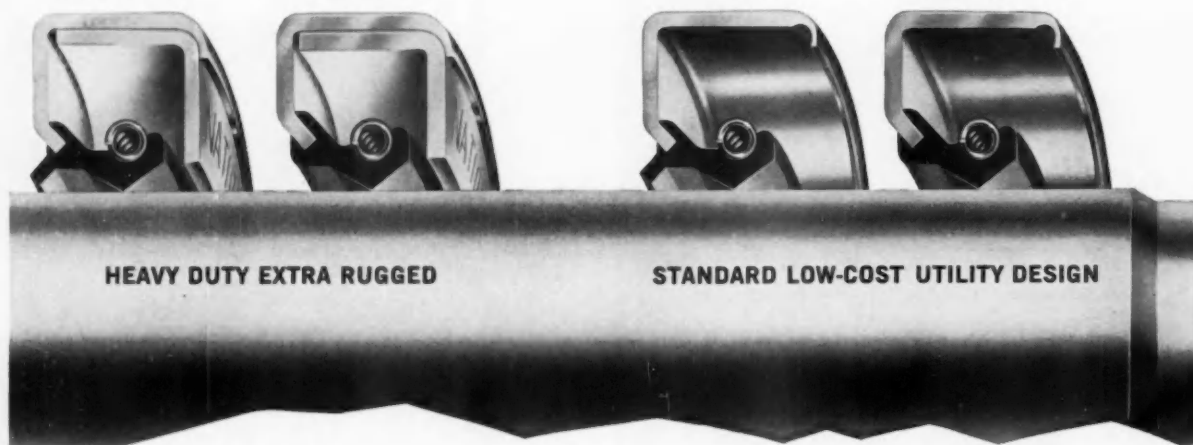
NATIONAL BUD* SEALS

410,000 series

450,000 series

470,000 series

480,000 series



New designs proven in 4 years
of field application

Permanent bonded sealing lip,
longer life, leakproof sealing

Rugged case won't distort under
severe press fit

Phosphate coating avoids rust

Seal has superior concentricity

Sealing materials for temperatures
—65° F to 400° F

Operates in most oils or
industrial fluids

National Seal engineers — who brought you Syntech® and Micro-Torc® — now offer a ruggedly simple new advance in precision shaft sealing — National BUD (Bonded Universal Design) Oil Seals.

BUD seals are designed for a broad variety of applications, including many where more complex

single-lip and double-lip designs were previously specified.

Full details and application engineering help on National BUD or other oil seals are available from your National Seal Division, Field Engineers. See the Yellow Pages under "Oil Seals" or write direct to Redwood City, Calif., home offices.

*TRADEMARK NATIONAL SEAL

NATIONAL SEAL

Division, Federal-Mogul-Bower Bearings, Inc.
General Offices: Redwood City, California
Plants: Van Wert, Ohio; Downey and Redwood City,
California.

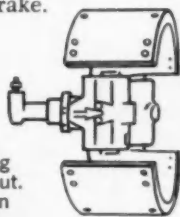


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ACTUAL TESTS PROVE:

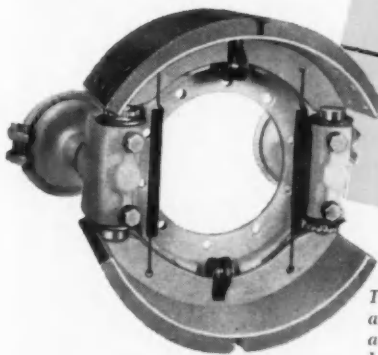
NEW STOPMASTER BRAKE IS the most advanced brake design in 30 years!

Over three years of thorough and demanding road tests have proven the superiority of the new Rockwell-Standard Stopmaster Brake. Of its many new improvements the Stopmaster incorporates these major advantages to meet the modern trucking industry's demand for a more efficient, more dependable brake.



New Stopmaster actuation principal results in higher braking efficiency with less input. In dual actuation design both shoes do an equal amount of work over the entire lining surface. This balanced shoe action assures more dependable service; faster, surer stops; less maintenance.

New Stopmaster 15" diameter permits increased air circulation between brake drum and wheel rim. This results in cooler operating temperatures... less heat fade, longer lining life, longer drum life. Smaller diameter means less weight.



The Stopmaster 15" Brake is available with either air or hydraulic actuation... also up to 30" diameter, with hydraulic actuation for heavy-duty, off-highway vehicles.

Another Product of...

ROCKWELL-STANDARD
CORPORATION



Brake Division, Ashtabula, Ohio

AVERAGE RESULTS OF NUMEROUS
HIGHWAY VEHICLE TESTS PROVE:

35% lighter weight..

more payload capacity!

38% less heat fade..

safer, more continuous operation!

57% less air volume required..

permits smaller air reservoir tanks!

56% longer lining life..

lower operating cost, less maintenance!

56% longer drum life..

more dependability, less downtime!

66% less adjustment required..

greater safety, reduced maintenance!

37% less service parts

smaller inventories, less expensive!

NOW! ALUMINUM

**CASE AND CLUTCH HOUSING for
Model 5-C-72, 5-C-720 and 5-W-74**



TRANSMISSIONS

cut weight **93 lbs.**

RESULT: MORE PAYLOAD ON EVERY TRIP

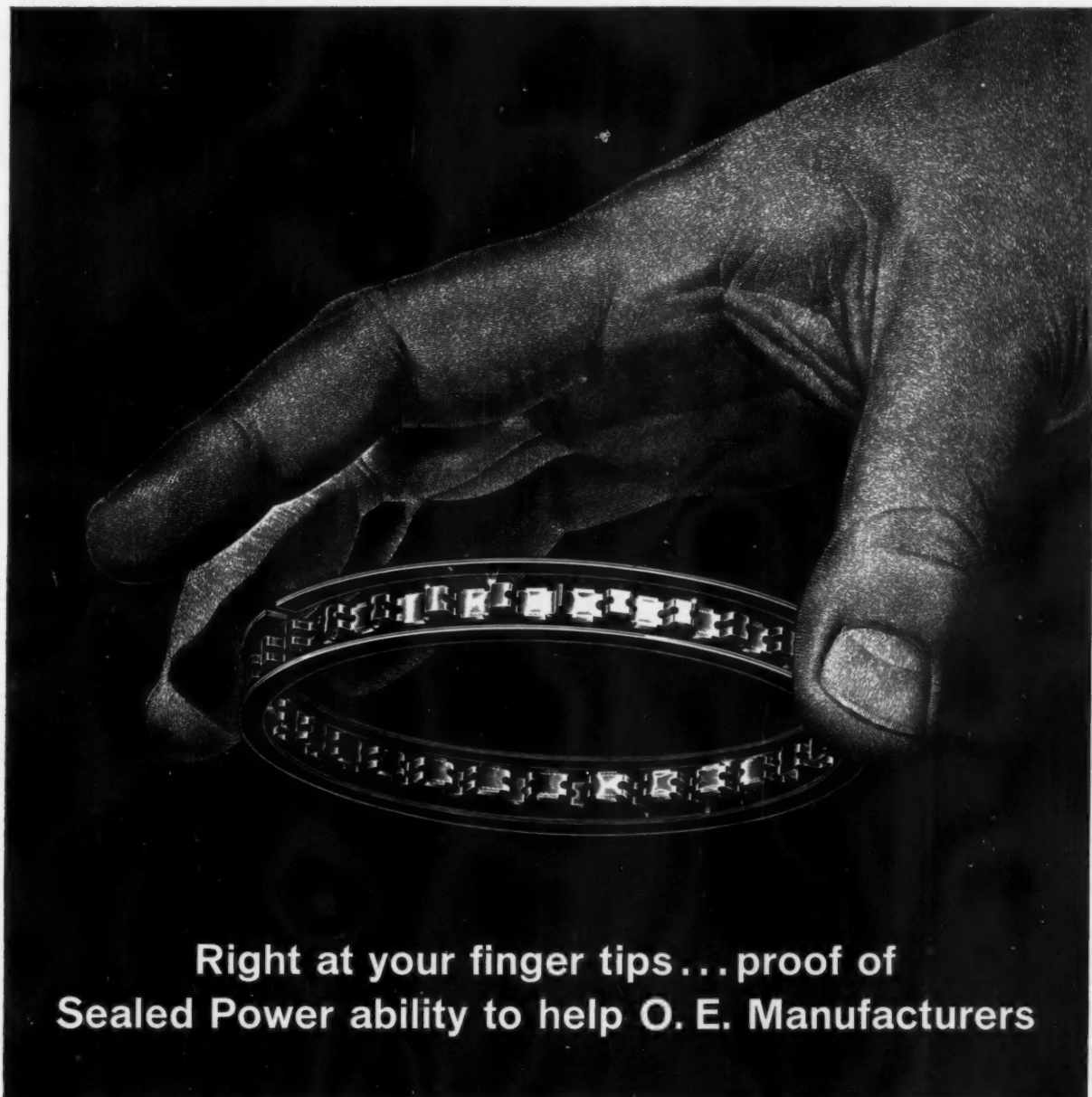
... that's the profit-building bonus now available to users of Fuller's heavy-duty Model 5-C-72, 5-C-720 and 5-W-74 Transmissions. Designed primarily for use with two-speed axles or auxiliaries, the five-speed transmissions can be ordered with aluminum alloy case and clutch housing which cut weight to only 368 pounds.* Multiply this 93-pound payload dividend by the number of trips per year and you'll see ... aluminum makes the Fuller 5-C-72, 5-C-720 and 5-W-74 Transmissions *your best buy* for reliable, profitable, heavy-duty operation. For further information, contact your truck or equipment dealer.

*With SAE #1 clutch housing. SAE #2 clutch housing also available for all 3 models.

FULLER

TRANSMISSION DIVISION
MANUFACTURING COMPANY
KALAMAZOO, MICHIGAN
Subsidiary EATON Manufacturing Company

Unit Drop Forge Div., Milwaukee 1, Wis. • Sholar Axle Co., Louisville, Ky. (Subsidiary) • Sales & Service, All Products, West. Dist. Branch, Oakland 6, Cal. and Southwest Dist. Office, Tulsa 3, Okla.
Automotive Products Company, Ltd., Brock House, Langham Street, London W.1, England, European Representative



**Right at your finger tips... proof of
Sealed Power ability to help O. E. Manufacturers**

U. S. PAT. NO. 2,789,872 STAINLESS STEEL OIL RING

Historically Sealed Power works closely with original equipment manufacturers—supplies products to your specifications, comes up with independent solutions to your problems.

The stainless steel oil ring is one such example. It was developed specifically to control oil consumption in modern, high compression engines. This ring worked—beyond expectations.

This was an unusual solution to a problem because Sealed Power turned to a completely new oil ring material, and a completely new ring design, to meet it. Sometimes such engineering feats are not required. But whatever the problem, Sealed Power research, the talents of our engineers, our manufacturing facilities are all presently dedicated to our common cause. They will continue to be so.

Sealed Power

Preferred Performance through Engineering and Research

SEALED POWER CORPORATION, MUSKEGON, MICHIGAN • ST. JOHNS, MICHIGAN • ROCHESTER, INDIANA • STRATFORD, ONTARIO • DETROIT OFFICE • 7-236 GENERAL MOTORS BUILDING • PHONE TRINITY 1-3440
PISTONS • PISTON RINGS • SLEEVES • SLEEVE ASSEMBLIES • SEALING RINGS FOR ALL APPLICATIONS

AUTOMOTIVE INDUSTRIES, April 15, 1960

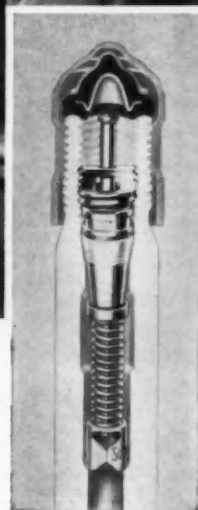
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The American Automotive Industry—the world's
Up-to-the-minute Engineering



*The Swivel-T Valve Core makes Schrader's famous
operating principle more than ever the
Ace of Standardization for pneumatic tire-equipped vehicles*



greatest enterprise—depends on tire accomplishments

constantly improves tire, valve and vehicle performance



THE SEARCH for ways to improve Schrader products never stops. Even the smallest details of each part are constantly and exhaustively examined.



DESIGN CHANGES are often made in the light of new materials with new properties which have been created in the world's technical laboratories.



ENGINEERING CREATIVITY produced a new valve core design with six new performance benefits. Teflon with its super-slippery characteristics helped make this possible.



SWIVEL-T VALVE CORES have already travelled with all kinds of vehicles in varying terrains, proving themselves to be the most dependable valves ever.

The Automotive Industries are quick to take advantage of new scientific discoveries. Pooling ideas, skills, and knowledge, engineers in many companies from the Automotive, Tire, and Tire Valve Industries cooperate to improve even the smallest details. One recent example is Schrader's Swivel-T Valve Core, which employs precisely-machined Teflon in the plug washer to prevent cores from sticking and to make a more positive air seal. This advancement is one of countless benefits which have resulted from cooperative effort . . . another contribution which helps make vehicles even more dependable no matter where they go.

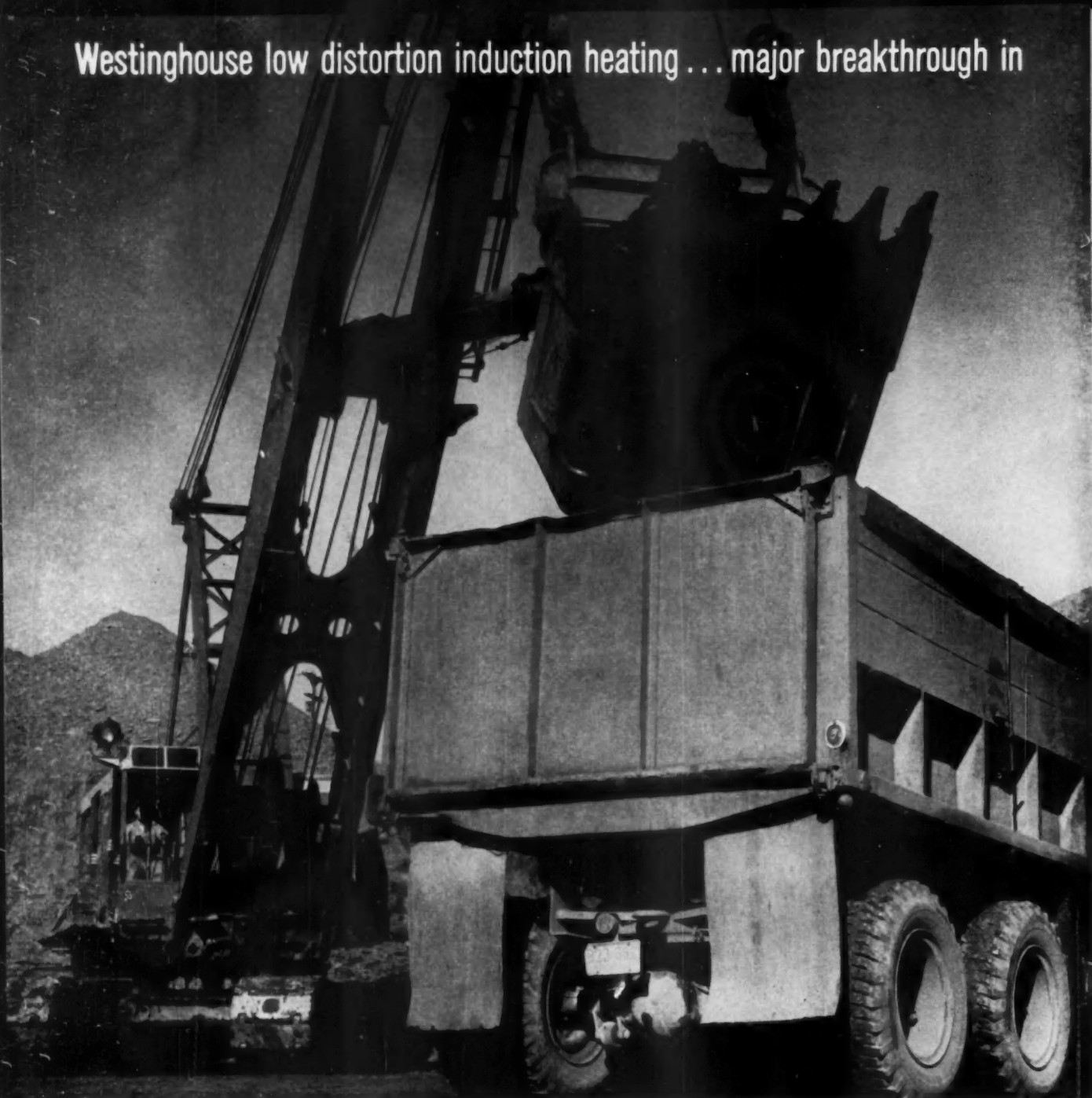
Schrader[®]
a division of **SCOVILL**

A. SCHRADER'S SON • BROOKLYN 38, N. Y.
Division of Scovill Manufacturing Company, Incorporated

FIRST NAME IN TIRE VALVES

FOR ORIGINAL EQUIPMENT AND REPLACEMENT

Westinghouse low distortion induction heating . . . major breakthrough in



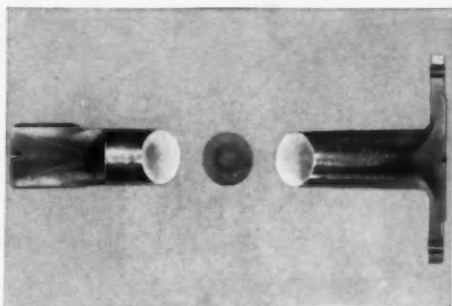
An axle has to be extra tough to take this kind of punishment. Low distortion induction heat treating makes it possible.

Why heavy duty trucks shoulder bigger loads

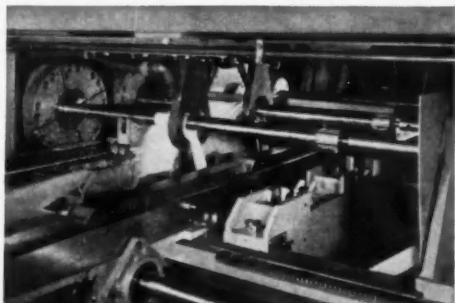
Conventional heat treating wasn't good enough for heavy duty truck manufacturers. They wanted a process that would increase axle strength with minimum distortion. That's why they are installing Westinghouse *low distortion* Induction Heating. Higher cost? Not with this new Westinghouse equipment. This method of induction hardening will actually cut costs . . . two ways. First — no

cold straightening required. Second — Westinghouse tests prove that axles made with 1041 carbon steel induction hardened with Westinghouse low distortion equipment are 50% stronger than axles made with 4150 alloy hardened in a furnace. Manufacturers also realize a savings of 2c per pound on material cost by using 1041 carbon steel instead of the 4150 alloy.

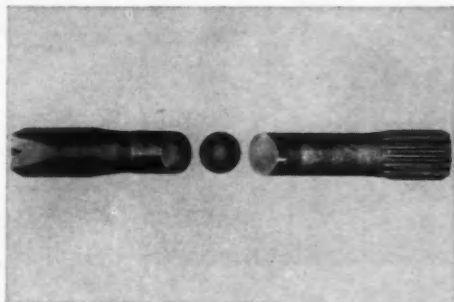
axle hardening



Westinghouse *low distortion* induction heating on a typical axle provided tensile strengths up to 300,000 psi using 1041 carbon steel. This compares with 200,000 psi using 4150 alloy and furnace treating.



The rugged Westinghouse Induction Scanner installs directly into the production line. No warm-up time required, no hot stock inventory. Equipment can be made to match your present and future production requirements.



Westinghouse induction heating offers more precise control of heated depth making it possible to replace a furnace treated alloy steel with a low carbon type.

without Axle Failure

Think of the savings Westinghouse low distortion Induction Heating would bring to you. Lower labor costs. Lower cost raw material. Fewer replacements. Better customer satisfaction. For complete details call or write your Westinghouse representative or Westinghouse Electric Corporation, Industrial Electronics Department, Baltimore 3, Maryland.

YOU CAN BE SURE...IF IT'S Westinghouse

WATCH "WESTINGHOUSE LUCILLE BALL-DESI ARNAZ SHOWS"

CBS TV FRIDAYS

Circle 195 on Inquiry Card for more data

J-35010

SAE National Automobile Week Meeting

(Continued from page 71)

this is a highly involved science, suffice it to say that organic chemists have found how to achieve polymerization control and have evolved a new art of stereopolymerization which yields a controlled atomic structure through the use of newly developed catalysts.

That aluminum applications in motor cars will double during the next five years was predicted by J. H. Dunn of Alcoa. He presented a picture of European developments where the usage of aluminum has outstripped usage in the USA.

On the subject of new developments, Dunn cited aluminum brake drums, and extruded aluminum bumpers. He is sure that aluminum bumpers are coming on future motor cars, and mentioned that one design saves some 32 lb compared with steel. In the near future aluminum fabricators will be able to offer a wider range of fast colors for decorative parts. The problems incident to the manufacture of aluminum radiators have been pretty well solved and there is reason to believe they will be cheaper than conventional radiators. The major bar to any general adoption at this time is the fact that aluminum fabrication will require entirely new plants and a considerable capital investment.

One of the notable advances that may be possible in the future is the development of ultrasonic welding techniques for welding aluminum to aluminum or to steel. ■

I-H to Boost Output, Acquires Factory

International Harvester expects to expand truck production facilities by about 25 per cent with the acquisition of a half-million sq ft plant adjacent to Harvester's Fort Wayne works.

Harvester plans to use the former United States Rubber Co. factory for specialized assembly of heavy duty trucks, and perhaps for some component manufacturing.

it
drives*



CYCOLAC®
THE BORG-WARNER PLASTIC THAT'S TOUGH, HARD, AND RIGID

Every year, the auto industry finds new applications for CYCOLAC—to the tune of important savings and an improved appearance for many products.

The 1960 Chrysler instrument panel you see above is a typical example.

This unique panel, molded of Borg-Warner CYCOLAC, cuts production costs because it replaces expensive die-cast metal with economical molded plastic.

It also replaces chrome plating with vacuum plating . . . another cost-economy. Product-appearance is improved because the toughness, hardness and rigidity of CYCOLAC enable it to keep its "like new" look for many years.

CYCOLAC *Better in more ways than any other plastic*

GET THE FACTS—WRITE TODAY!

MARBON CHEMICAL
WASHINGTON



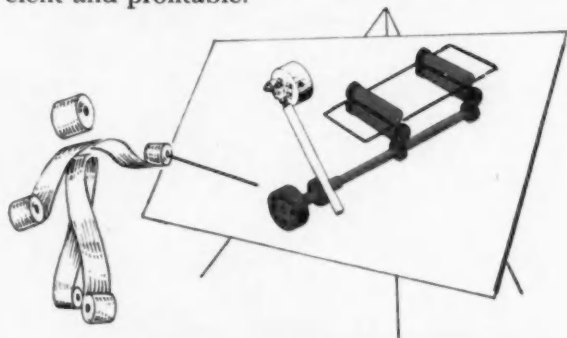
DIVISION **BORG-WARNER**
WEST VIRGINIA

LITTELL ROLL FEEDS

Make Press Production REALLY ROLL

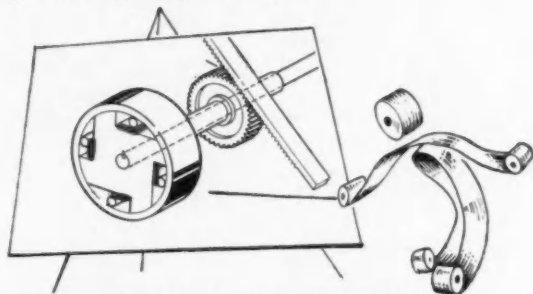
Old Pro "Coily" Points Out Why

"Coily" has been around press rooms since coil stock came into the picture. He has seen Littell Straighteners and Feeds widely copied, in design, (but not in performance) time after time. He points here to a few of the new advanced design Littell Roll Feed features that make punch press operation more efficient and profitable.



GEARS AND ROLLS ARE PRECISION CONTROLLED

Littell Rolls and Gears respond to control because they are light in weight. With less inertia to overcome, these strong, yet light rolls and gears start easy, go faster, and stop quickly. Big, new type disc brakes further assure the control that means accurate feeding in the higher speed ranges.



SUPER DURABLE OVER RUNNING CLUTCH

Thanks to the exclusive Littell carbide cam construction that Coily points to, not a single clutch of this type has worn out in ten years of operation!

2 New Bulletins For Punch Press Operators



Bulletin A-11
Describes Roll Feeds
For OBI Presses

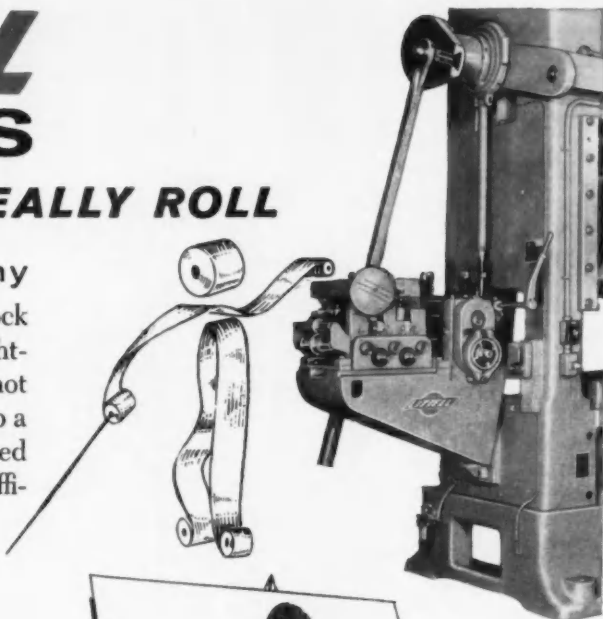


Bulletin A-15
Describes Roll Feeds
For Straight Sided Presses.

For free copies, address your request now.

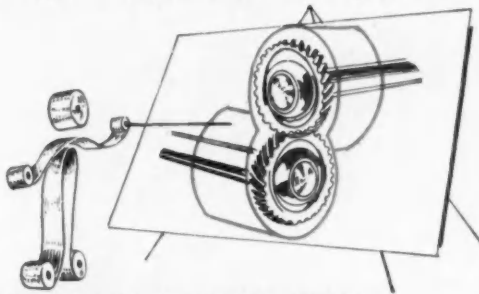
ROLL FEEDS • SHEETING LINES • STRAIGHTENING AND FEEDING MACHINES • REELS AND CRADLES FOR COIL STOCK

AUTOMOTIVE INDUSTRIES, April 15, 1960



LITTELL MICRO RUNNING ADJUSTMENT

enables the punch press operator to adjust feed length plus or minus $\frac{1}{8}$ " while press and feed are running. A big help in setting up progressive dies requiring extremely accurate feed lengths.



"CUSTOM BUILT" GEAR HOUSINGS

permanently hold Littell spiral gears in perfect alignment because each gear housing is specially machined for the individual spiral gears it seals in oil and protects. A Littell sustained accuracy feature.



4111 N. Ravenswood Ave., Chicago 13
District offices: Detroit, Cleveland

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GOWN BY FON TAYNE; STAINLESS



from creative Crucible

Where a fine finish is only the beginning

The lustrous beauty and unsurpassed finish of Crucible stainless steel will enhance the sales appeal of any product. Crucible's experienced metallurgists can help you select the most suitable type, form and finish, and the most efficient technique for fabricating. Add to this the convenience of Crucible's nearby steel service centers (34 throughout the country) and you'll find Crucible an unbeatable combination — for superior steel . . . service . . . and supply.

CRUCIBLE

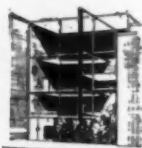
Stainless Steel

SHEET, STRIP, ROD AND WIRE BY CRUCIBLE STEEL COMPANY OF AMERICA PITTSBURGH 30, PA.

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AUTOMOTIVE INDUSTRIES

A CHILTON



PUBLICATION

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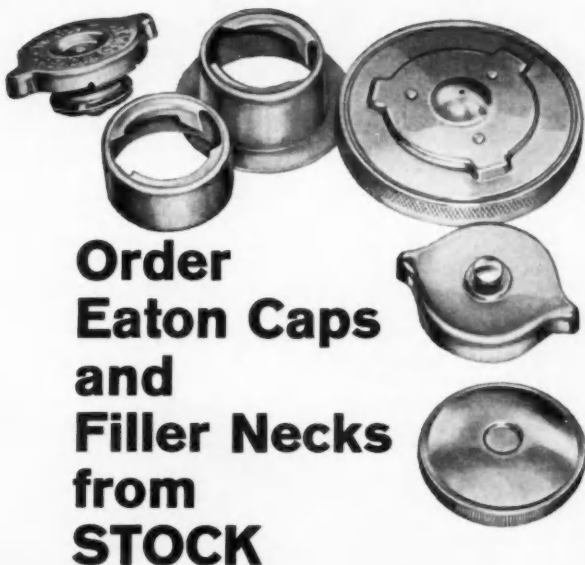
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| Z | |
| Zollner Corp. | 3rd Cover |



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The new LARC-5

has everything designed for lightweight ruggedness including planetary axle ends by Clark

The Army's new amphibious lighter, the LARC-5, with welded aluminum hull and water-tight cargo deck, is designed to give better performance both in water and on land. It's essentially a marine craft, but has four low-pressure tires which give exceptional on-land mobility. The Larc's designers, the Ingersoll Kalamazoo Division of Borg-Warner Corporation, chose Clark Planetary Axle Ends for this vehicle.

By putting the final power reduction in these Axle Ends, 70% of the torque load is taken off the axle shafts and other parts of the power train, allowing light weight yet reliable component design.

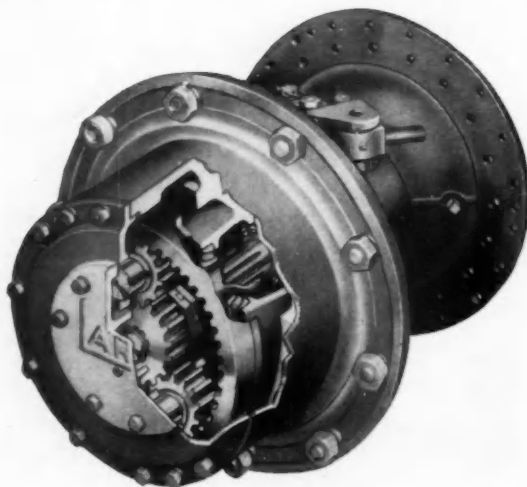
This is another example of how Clark's design experience and broad standard line of axles and axle ends—the broadest in the industry—can serve the needs of trucks, tractor shovels, and other heavy duty vehicles. Clark Planetary Axles, for example, are available in capacities ranging from 6,500 lbs to 120,000 lbs. For further information, address a card or a call to:



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With Clark planetaries, final reduction is accomplished in hub, by sun gear splined to axle shaft. Ring gear is fixed; wheel is driven by three revolving planet gears.



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D-C Motors 1

Bulletin GEC-1539 is a two page, illustrated publication that lists ratings and frame size of a line of open and totally enclosed fractional horsepower motors. It also covers features and dimensions of these motors. *General Electric Co.*

Selection Handbook 2

This booklet was designed to aid in the selection of an appropriate power plant for a specific application. It is divided into sixteen sections and covers every area of the line. *Caterpillar Tractor Co.*

Engine Power 3

Thirteen pages are directed at the original equipment manufacturer to aid him in reviewing the caterpillar engine line. It covers the facilities, production and personnel at the *Caterpillar Tractor Co.*

Technical Brochure 4

Designated number SP9-1, a new twelve page technical brochure describes a line of stepper motors and pulsed stepping devices. Product features, typical applications and construction data are given along with schematic drawings and illustrations. *A. W. Haydon Co.*

Design Catalog 5

Illustrations, graphs and charts cover the operating characteristics and design details of power plants and their components. Cutaway views and a schematic drawing shows the details of this line. *International Harvester Co.*

Diesel Plants 6

Features, illustrations and technical information is all included in an eight page booklet that covers a line of diesel motors. It is offered by *Kohler Co.*

Specification Data 7

Engines in the 3 to 56 horsepower range are described in both the two and four cylinder models. It contains charts and graphs to show composite power and specification data. *Wisconsin Motor Co.*

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Engine Catalog 8

There are twenty nine industrial engines illustrated and described in seven pages along with a chart of specifications. *Caterpillar Tractor Co.*

Unitized Motors 9

Electrical performance and dimension data are shown in a new catalog that covers a line of unitized, two-pole, 33-frame, shaded pole motors. This bulletin contains charts, graphs and specification information. *General Electric Co.*

Engineering Booklet 10

Six cylinder engines from 145 to 185 horsepower, and V-eight models from 207 to 235 horsepower are covered in a sixteen page publication. It shows detailed specifications, illustrations and charts that cover the torque and output of horsepower of the various engines. *Diamond T Motor Truck Co.*

Power Rating Charts 11

Four, six and eight cylinder power plants are covered in two charts. Performance data is given with and without the use of a fan. It details different types of fuel, the torque and rpm with these fuels, and the power units maximum hp at rpm's from 1400 to 2800. *International Harvester Co.*

Air-Cooled Engines 12

Industrial engines that are cooled by an air system are described in a booklet that shows specifications, dimension drawings and operating characteristics. *D. W. Onan and Sons Inc.*

Liquid Gas Engines 13

Eight power curve charts are shown in a four page bulletin that covers a line of engines that operate on liquefied petroleum gas. In addition to the illustrations it contains operating benefit information of these power plants. *Wisconsin Motor Co.*

Industrial Power 14

Engine power, water power, steam power and atomic power are all illustrated in a catalog that covers a line of diesels and shows the components that go into the manufacturing of these power plants. Cut-away views are also illustrated with color guides. *Allis-Chalmers Mfg. Co.*

Electric Plants 15

A special folder describes a line of gasoline engine-driven electric generating plants. Charts show various important specification and performance data. Watt capacities range from 500 to 85,000 in these charts. *D. W. Onan and Sons Inc.*

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Aluminum Welding 16

A complete survey of aluminum welding, brazing and soldering is included in a comprehensive, 40 page, pocket size manual. Illustrations and charts are in this material and cover the three processes. *All-State Welding Alloys Co., Inc.*

Tables and Vises 17

Rotary and indexing tables and angle vises are covered in a handy pocket size 18 page booklet. Illustrations, charts and technical information show all the details of the lines. *Palmgren Products, Chicago Tool and Engineering Co.*

Technical Catalog 18

A new technical reference on industrial socket screws, believed by the manufacturer to be the most complete ever compiled, contains 82 pages of extensive design data, performance information and illustrations to completely cover a family of fasteners. *Standard Pressed Steel Co.*

Weld Transformers 19

This new 20 page technical brochure contains precise data on resistance welder transformers including: construction techniques, transformer rating and load demand, magnetizing and load transients, application and duty cycle. Many photographs show transformer under construction. Formulae are provided for calculating kva loading at various duty cycles, with consideration of series parallel windings, eight step windings, etc. Schematic diagrams, drawings, charts and graphs aid in providing a basic understanding of resistance welder transformer design. *The Taylor-Winfield Corp.*

Fasteners 20

A six page folder illustrates and describes the manufacturing operations, rigid quality controls, engineering, and plant facilities that are employed in production at the *Standard Screw Co.*

Fork-Truck "Costs" 21

A new twelve-page brochure makes it possible to estimate, in a matter of minutes, the costs incurred by industrial trucks. So far as is known, this is the first time that monographs or alignment charts have been available to show costs of depreciation, operation, and maintenance accurately for both gasoline-powered and battery-powered trucks. After very little study, anyone with the basic data on his plant operation can arrive at a reliable cost estimate for each factor in a minute or less. *Lead Industries Association.*

Ball Bearings 22

Charts, graphs and illustrations cover a complete line of ball bearings in an eight page booklet. Cut-away views show the construction details of assembled bearings. *Split Ballbearing, a Div. of MPB, Inc.*

Engineering Handbook 23

This Handbook is fully illustrated and describes with drawings and graphs the simplicity of operation of patented Taylor liquid spring shocks using liquid compressibility and provides monographs and formulae so the designer can determine the space reduction for a given force or energy using a liquid spring shock. *Taylor Devices, Inc.*

Wire Cloth Filters 24

Typical fluids and systems that can use Bendix Poromesh and Micromesh wire cloth filters are discussed in a new four page brochure. Details of design features, environments, construction, performance and metals for these wire cloth filters are also covered. Photographs and line drawings illustrate this data. *Bendix Filter Div., Bendix Aviation Corp.*

Gear Catalog 25

Gears of all shapes, sizes and applications are covered in a 35 page publication. It is complete with engineering and design data, and shows many manufacturing and application illustrations. Drawings give a picture of technical matter. *Spiroid Div., Illinois Tool Works.*

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Welding Brochure 26

A new 24 page brochure jam packed with photographs of 268 welded products and 20 photographs of welders and laboratory facilities. Included are actual case histories showing how modern resistance welding machines are selected or specially engineered for the needs of particular welded products. Types of welding shown are: spot; projection; arc; flash-butt and others. *The Taylor-Winfield Corp.*

Engineered Castings 27

The engineering facilities and services used in the production of castings from a wide range of iron alloys are presented in this 12 page, 4 color illustrated brochure. The brochure also contains a useful comparative properties chart and description of the standard, high nickel and ductile iron produced. *Hamilton Foundry Inc.*

Testing Systems 28

A chart, which shows the approximate relation between hardness by various testing systems and tensile strength of carbon and alloy steels, covers Brinell, Monotron, Vickers, Rockwell (B, C and E scales) and Scleroscope. *Tubular Products Div., Babcock and Wilcox Co.*

Gasket Material 29

Four pages cover a new gasket material and illustrations show some of the areas this material has already been applied to. Charts show the specifications and strength data of these gaskets. *Spaulding Fibre Co.*

Fuel Cells 30

A 12 page booklet discusses basic facts about fuel cells including how they work, problem areas, various types of fuel cells that are under development, technical performance data and application information. Special features of GE's ion-membrane fuel cell are included along with graphs, charts, schematic drawings and diagrams to illustrate the text. *General Electric Co.*

Special Products 31

A new special products catalog is available that describes and illustrates three new high speed forming machines. These machines are opening broad horizons in forming metal parts. Many of the techniques and advantages in radial draw, stretch and compression forming are utilized in the new machines. Actual parts produced are illustrated along with production, tooling and material savings. *The Cyril Bath Co.*

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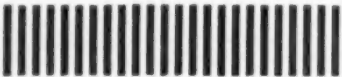
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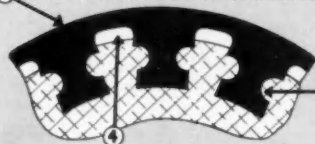
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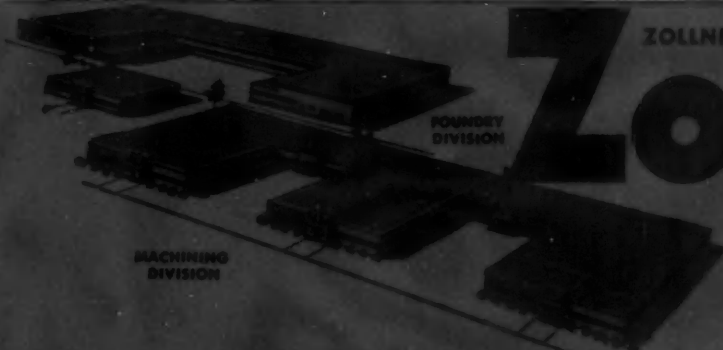
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CASE HISTORIES



Photo: Courtesy Stratos Division, Fairchild Engine and Airplane Corp.

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